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MANUAL

OF THE

NEW ZEALAND FLORA.

BY

T. F. CHEESEMAN,

F.L.S., F.Z.S., F.N.Z.Inst.,
Linnean Gold Medallist and Hector Medallist,
Curator of the Auckland Museum.

Second Edition. Revised and Enlarged by the Author.

EDITED BY

W. R. B. OLIVER,

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WELLINGTON, N.Z.

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PREFACE TO THE FIRST EDITION.

FORTY-TWO years have elapsed since Sir J. D. Hooker published the first part of his "Handbook of the New Zealand Flora." Although no complete account of the plants of the colony has since been prepared, botanical investigations have been actively and zealously carried on, and a large amount of fresh material obtained. No less than four hundred separate communications or short papers dealing with the botany of New Zealand have been published, and the number of new species proposed is considerably over a thousand. The literature and descriptions of the new species are scattered through the thirty-seven volumes of the "Transactions of the New Zealand Institute" and other publications, some of which are not readily accessible to the majority of workers in the colony. To make satisfactory use of such a mass of unarranged and undigested material is beyond the power of any except a few experts: in any case an attempt to do so would prove both tedious and troublesome. In short, the want of a compendious Flora has long been a serious hindrance to the study of the indigenous vegetation, and a bar to inquiries of any kind connected therewith.

For many years New Zealand botanists hoped that the preparation of a new Flora would be undertaken by the late Mr. T. Kirk. It was known that he had long been collecting material for such a work. His many journeys, extending from the North Cape to the Auckland and Campbell Islands, had given him an unrivalled personal acquaintance with the vegetation, while his numerous writings afforded abundant proof of widespread knowledge, and of accurate and careful botanical research. Under such circumstances, the announcement made in 1894 that he had been engaged by the New Zealand Government to prepare a "Students' Flora of New Zealand" was received with general approval. And when his death occurred in 1897 it was a disappointment to find that barely two-fifths of his task had been completed. This portion has since been printed by the Government, and its value intensifies the regret that the author did not live to complete the work for which he had made so much preparation, and for which he possessed so many undoubted qualifications.

The publication of the fragment left by Mr. Kirk made the want of a complete Flora still more apparent, and in April, 1900, the Government was pleased to entrust me with the preparation of such a work. While allowed full freedom of action in all details, I was instructed to follow the

general plan adopted in Sir J. D. Hooker's Handbook, which, as is well known, was based upon that recommended many years ago by Sir W. J. Hooker for a uniform series of Floras of all the British colonies. With the view of keeping the work within the compass of one volume of portable size, I was further directed to confine it to the indigenous plants, thus departing from the plan followed by Kirk, who included all well-established naturalized plants, distinguishing them from the native species by a difference in the type.

The "Manual of the New Zealand Flora," which is the title adopted for the present work, is intended to comprise within a reasonable compass full descriptions of the whole of the indigenous flowering-plants and ferns found within the limits of the Colony of New Zealand, including not only the two main Islands, but also the outlying groups of the Kermadec Islands, the Chatham Islands, the Auckland and Campbell Islands, Antipodes Island, &c. I have also included Macquarie Island, for although it is politically an appanage of Tasmania, it is more closely allied in its flora and fauna to the Auckland and Campbell Islands than to any other land. In addition to the descriptions, I have given as fully as possible the geographical and altitudinal range of each species within the colony; and, in the case of non-endemic plants, a short statement of their range in other countries. I have also inserted, in a concise form, such general information, whether economic or scientific, as appeared to be of sufficient value. Believing that the main object of a Flora is to afford a ready means of determining the name of any species for the purpose of ulterior study, I have endeavoured so to frame the descriptive matter as to facilitate the work of identification as much as possible. I have therefore prefixed to each order and each genus analytical keys in which the salient characters of the genera and species are contrasted. With respect to the descriptions themselves, they are in almost all cases original, and have been based on the actual examination of living or dried specimens, usually both. After their preparation they were compared with those of my predecessors, and particularly with those of Hooker and Kirk, when any additions or alterations that appeared to be necessary were made. With regard to the citation of previous authors, I have as a rule considered it unnecessary to do more than quote the publications that deal solely or mainly with New Zealand botany, such as Forster's Prodromus, A. Richard's Flora, Cunningham's Precursor, Raoul's Choix, and the works of Hooker and Kirk. Had I given references to general works on botany or to special monographs the bulk of this work would have been greatly increased without sufficient corresponding advantage. I have, however, quoted the publication in which the species under consideration was first described; and, in the case of those plants which extend to Australia or Tasmania, I have usually given a reference to Bentham's "Flora Australiensis" or Hooker's "Flora of Tasmania."

The synonymy I have treated in a similar manner. As far as the information at my command would permit, I have quoted all published names of endemic New Zealand plants, and all names founded upon New Zealand specimens. Further quotation would, in my opinion, be neither necessary nor expedient for the purposes of this work.

Every botanist who prepares a Flora starts from the standpoint reached by his predecessors in the same field. In the subjoined history of botanical discovery in New Zealand I have endeavoured to give a sketch of the labours of all those who have investigated the botany of the colony, either as authors or collectors, and who have thus assisted in providing material for future study and research. But, in addition, it is advisable to briefly mention the chief material upon which the present work is founded. At the outset I must state that I have relied very largely upon my own notes and observations, formed during thirty-five years' continuous study of the flora, and upon my herbarium, which I believe to be the largest and most complete formed by individual effort within the colony.

I am indebted to the Education Department for the loan of that portion of the herbarium of the late Mr. Kirk which after his death was purchased by the New Zealand Government. Although comprising only a small part of the collections formed by this active and enterprising botanist, it nevertheless includes excellent and well-selected specimens of most of the species of the flora, including the types of the new species described by him, and has consequently proved an important aid to me. It is to be regretted that Mr. Kirk's botanical papers and other manuscripts, none of which I have seen, were not included in this purchase.

The Education Department has also placed at my service a set of the plants collected by Banks and Solander during Cook's first voyage, a transcript of Solander's manuscript descriptions, and a set of impressions from the copper plates prepared by Sir Joseph Banks to illustrate the descriptions. All these were presented to the Government a few years ago by the Trustees of the British Museum, and form a unique and valuable addition to the public collections of the colony.

I am indebted to my friend Mr. D. Petrie, well known for his successful exploration in the Otago District, for the very valuable and important aid afforded by the study of his herbarium, which he has loaned to me in instalments during the progress of this work. It is specially rich in specimens of the rarer alpine plants of Otago, which, as a rule, are very poorly represented in other collections.

The herbarium of the late Mr. Colenso has been lent to me by Mr. H. Hill, one of the trustees under his will. It contains a large amount of material, collected at various times between the years 1840 and 1898, but is to a great extent unarranged and unclassified. Fortunately,

however, it includes named specimens of many of the supposed "new species" described by him during the last fifteen years of his life, and has thus enabled me to come to more certain conclusions respecting them than would otherwise have been the case.

The private herbarium of the late Mr. John Buchanan has been forwarded for my inspection by the Council of the Otago University, to which body it was bequeathed. Although but a fragment of the collections he formed during his lifetime, it has been of considerable service, as it includes the types of most of his new species, and the drawings and analyses prepared for his work on the New Zealand grasses.

My friend Dr. Cockayne has supplied me with much valuable information, and a considerable amount of interesting material from the Southern Alps, the Chatham Islands, and other localities explored by him. Many of his specimens have been of particular value, from being specially selected to show the range and trend of variation in some of the more variable species of the flora.

The Right Rev. W. L. Williams, Bishop of Waiapu, has placed me under many obligations by regularly forwarding specimens collected by him in the East Cape and Hawke's Bay districts, and by his invaluable help in compiling the list of Maori plant-names given in the Appendix.

Mr. W. Townson, of Westport, has for many years supplied me with numerous sets of specimens, both fresh and dried, collected by him in the south-west portion of the Nelson Provincial District, and often obtained from out-of-the-way localities and at considerable altitudes. So little was previously known respecting the botany of this portion of the colony that his collections and notes have been of great service to me.

I am indebted to Mr. A. Hamilton for the loan of his extensive collection of the ferns of the colony. This is not only unusually complete and well arranged, but also contains many specimens of crested and other abnormal varieties.

I have also to record my thanks to Sir James Hector, Mr. J. D. Enys, Mr. G. M. Thomson, Mr. H. Hill, Mr. Justice Chapman, Mr. Percy Smith, Mr. H. J. Matthews, Mr. F. R. Gibbs, Mr. J. H. Macmahon, Mr. J. Adams, Mr. R. H. Matthews, Mr. H. Carse, Mr. Elsdon Best, Mr. R. J. Kingsley, Rev. F. E. Spencer, Mr. H. C. Field, Mr. J. Rutland, Mr. F. A. D. Cox, Mr. J. Hall, Mr. H. H. Travers, Mr. J. B. Simpson, and several others, for the material assistance they have rendered me.

Turning from New Zealand, I have now to express my gratitude to several friends and correspondents in Europe. First of all, I wish to tender my special thanks to Sir J. D. Hooker, who during a correspondence extending over thirty-five years has been at all times ready to give me the benefit of his wide knowledge and experience, and who has evinced

the greatest possible interest in the inception and progress of this work. My thanks are also due to Sir W. T. Thistleton-Dyer, the present Director of Kew, for his kindness in granting facilities for the comparison of my specimens with the types preserved in the Kew Herbarium, and for other valuable assistance; also to Mr. W. B. Hemsley, the Assistant Director, who has given me much helpful aid with the greatest readiness and kindness; and to Mr. N. E. Brown, who was specially instructed by the Director to make a comparison of my specimens with the types of the species in *Veronica*, *Gentiana*, *Myosotis*, and other genera, and whose report on the subject has been invaluable to me. I am also greatly indebted to Mr. C. B. Clarke for his unwearied kindness in supplying me with information and critical notes respecting the New Zealand *Cyperaceae*, and for furnishing me with a list of the synonymy of the species. Pastor G. Kukenthal, of Grub, near Coburg, has also contributed valuable notes respecting the New Zealand species of *Carex* and *Uncinia*. Finally, I am under many obligations to Professor E. Hackel, of Graz, Austria, for undertaking a critical examination of the whole of the New Zealand grasses, and for furnishing me with a series of very full and complete notes, with permission to use the same for the purposes of this work.

The elimination of the naturalized species from the present work, although absolutely necessary to keep it within the limits of a single volume, will not be altogether satisfactory to the student. A beginner cannot be expected to distinguish between the indigenous and introduced species, especially when it is remembered that in several districts the latter now constitute the larger portion of the flora, and that there is no part of the country, however remote, into which some plants of foreign origin have not penetrated. Altogether, over six hundred species, or nearly one-half the number of the indigenous flowering-plants, have succeeded in establishing themselves. I am not without hopes that I may be enabled to prepare a supplementary volume containing concise but sufficient descriptions of the foreign element of the flora; for this alone will remove the inconvenience resulting from the want of a ready means of determining all the plants which a student may observe in any district. In the meantime, I have given in the Appendix a nominal list of all well-established naturalized plants, with references to books in which descriptions of them can be found. As most of the species are of European origin, I would recommend the student to provide himself with a copy of Hooker's "Students' Flora of the British Islands," or some similar work, and to use it in conjunction with this publication.

It is not to be expected that a work containing descriptions of over 1,550 species of plants can be prepared without the occurrence of errors and imperfections, and for these I must ask the indulgence of the reader. One serious disadvantage under which I have laboured, and which I share

in common with all colonial botanists, is the impossibility of examining those European herbaria in which the types of so many of the published species are deposited; and consequently mistakes may have been made in the identification of the species, especially in genera like *Veronica*, *Gentiana*, *Myosotis*, &c. But I trust that the number of such errors is not large. Their detection may be safely left to future workers.

A few statistics respecting the extent and composition of the flora may be of interest. The total number of species described, including a few additions given in the Appendix, is 1,571, of which 1,415 are phaenogams, and 156 vascular cryptogams. These are contained in 382 genera, distributed in 97 orders. The average number of species to each order is slightly over 16; the average number of species to each genus rather more than 4. The orders containing more than 24 species are as under:—

Compositae	221	Ranunculaceae	50
Filices	138	Rubiaceae	47
Cyperaceae	119	Epacrideae	31
Scrophularineae	113	Onagrarieae	31
Gamineae	113	Leguminosae	26
Umbelliferae	62	Juncaceae	25
Orchideae	57	Boraginaceae	25

The *Compositae* thus constitute one-seventh of the whole flora, an unusually high proportion. The genera containing 20 species or more are—

Veronica	84	Senecio	30
Carex	54	Epilobium	28
Celmisia	43	Poa	25
Coprosma	40	Myosotis	23
Ranunculus	38	Hymenophyllum	20
Olearia	35		

Of the total number of species (1,571) no fewer than 1,143, or nearly three-quarters of the entire flora, are peculiar to the colony. With respect to the 428 species which are found elsewhere, 366 extend to Australia, and 108 to South America. Coming to the local distribution of the species, 789 are found in both the North and South Islands, 219 occur in the North Island but have not yet been detected in the South Island, while 456 species known to occur in the South Island have not been collected in the North Island. No fewer than 23 species are found in the Kermadec Islands but not in any other portion of the colony; 25 in the Chatham Islands; 10 in Stewart Island; and 48 in the outlying islands to the south of New Zealand, including in the term the Auckland and Campbell Islands, Antipodes Island, and Macquarie Island.

It now only remains for me to express my grateful thanks to the Education Department, under whose auspices the work has been prepared, for the readiness with which it has co-operated with me in endeavouring to render it as complete and reliable as possible. In this connection I would specially mention the Right Hon. R. J. Seddon, Minister of Education, and Mr. G. Hogben, M.A., the Inspector-General of Schools. My thanks are also due to the Council of the Auckland Institute and Museum for kindly allowing me to engage a substitute to perform a portion of my duties at the Museum during the progress of the work. Finally, I have to express my obligations to the Government Printer for the assiduous care with which he has attended to the passage of the work through the press.

Auckland, January, 1906.

PREFACE TO THE SECOND EDITION.

THE present edition of the "Manual of the New Zealand Flora" has, unfortunately, not received the final revision of the author. Mr. Cheeseman died at Auckland on the 15th October, 1923. At that date he had completed the manuscript of the main portion of the work, the synoptical key to the families, the list of Maori names, and the glossary. He was working at the list of introduced plants, about half of which had been completed. The latter half of this list I have completed from the notes left by Mr. Cheeseman and from his published papers. I have made no attempt to revise it in accordance with all the information published since the appearance of the first edition of the Manual, as I did not wish to impose my own views on any portion of the work which would bear his name as author.

For a similar reason I have not altered anything in the main portion of the flora, other than correcting obvious errors and revising references for the sake of consistency. The spelling of the generic and specific names and use of capital letters stands, therefore, as Mr. Cheeseman left them. The original preface and the section dealing with the history of botanical discovery in New Zealand had not been altered by Mr. Cheeseman, and are here reprinted in their original form. The present edition, therefore, is the work of Mr. Cheeseman as he left it at the time of his death, with the addition of the following portions, namely: The present preface, review of botanical work from 1905 to 1924, and the list of the published works of Mr. Cheeseman, all of which I have myself prepared, while Mr. Elsdon Best has kindly supplied a further list of Maori names of plants, and these have been included in the general list and there duly acknowledged.

A considerable portion of the Manual had been finally printed off before I took over the work of correcting the proofs, and a certain amount of inconsistency in the method of quoting authors and references to literature has resulted from the practice of printing off each sheet separately and immediately breaking up the type. In that portion of the work which I have corrected I have, when the original paper was accessible to me, quoted the title of the volume and the page number for each reference. Mr. Cheeseman followed various practices, in several cases quoting the number of the species and not the page, or the title of the paper instead of the journal in which it appears. Thus Cunningham's paper appears as *Precur.*, but this is merely an abbreviation of the title of the paper, and as I have not had access to it I have let the references as quoted by Mr. Cheeseman stand.

Errors are unavoidable in a volume of the size and nature of a flora, and where the work passes from one person to another detection of such is made less easy. It is hoped, however, that those that appear in the present edition of the Manual are not many and are obvious or unimportant omissions or misspellings. No doubt they will be found mainly in the references following the descriptions of the species.

In the preface to the first edition Mr. Cheeseman gave some figures relating to the extent and composition of the flora. Similar information based on the present edition has therefore been compiled and is given in the succeeding paragraphs.

The total number of species described is 1,763, or 192 more than in the first edition. These are distributed over 390 genera included in 104 families. But of these, Filices, treated by Mr. Cheeseman as a single family, is now generally considered to be a class of which the New Zealand species belong to 9 families. The average number of species to a family is 17, and of species in a genus is 4·5. These figures are higher than those quoted by Mr. Cheeseman, the difference being due to the number of new species described since the first edition, especially in the larger genera of flowering-plants. The species consist of 159 Pteridophytes, 20 Gymnosperms, and 1,584 Angiosperms, of which 400 are Monocotyledons and 1,184 Dicotyledons.

The families containing more than 24 species are as under:—

Compositae	261	Onagraceae	40
Filices	141	Epacridaceae	33
Scrophulariaceae	138	Boraginaceae	33
Cyperaceae	123	Leguminosae	32
Gramineae	123	Juncaceae	27
Umbelliferae	79	Liliaceae	27
Orchidaceae	66	Gentianaceae	26
Ranunculaceae	53	Cruciferae	25
Rubiaceae	52		

The genera containing 20 species or more are—

Veronica	103	Aciphylla	25
Celmisia	58	Gentiana	24
Carex	55	Pittosporum	23
Coprosma	44	Cotula	23
Olearia	42	Raoulia	22
Ranunculus	41	Carmichaelia	21
Epilobium	37	Hymenophyllum	20
Senecio	35	Anisotome	20
Myosotis	31	Dracophyllum	20
Poa	28		

Of the 1,763 species comprising the indigenous vascular flora of New Zealand, 1,329, or 75·4 per cent., are confined to the Dominion. Of the 434 species which are found elsewhere, 369 extend to Australia and 112 to temperate South America. The last figure includes 30 species found in temperate South America and New Zealand but not in Australia. Of the 369 Australian species, 252 do not extend to South America at all, 82 extend to temperate South America, some being tropical as well, while 35 extend to tropical but not to temperate South America. There are 35 species of vascular plants found in New Zealand and some country other than Australia or South America.

The local distribution of the species is as follows: Found in both the main Islands, 847 species; found in the North Island but not in the South Island, 250 species (three of these also found in Stewart Island); found in the South Island but not in the North Island, 528 species. The outlying islands contain many plants not occurring in other portions of the Dominion, though some may extend to Australia, South America, or other countries. In the Kermadec Islands are 25 species; in the Chatham Islands, 33 species (including 1 species also found in the Auckland Islands); in Stewart Island, 22 species; in the Subantarctic Islands, including The Snares, Auckland, Campbell, and Antipodes Islands, 56 species. (The localities of two species described in the present edition are unknown.)

In correcting the proofs of Mr. Cheeseman's Manual the work has been mainly to ensure that the manuscript has been printed correctly, hence I have come in contact mostly with the Government Printer and his staff, and particularly with the Superintendent, to whom I tender my sincere thanks for many obliging acts. My thanks are also due to Dr. L. Cockayne and Professor H. B. Kirk for advice in selecting the matter which I have contributed, and to Mr. J. H. Maiden, Director of the Sydney Botanic Gardens, for supplying dates for many references which were not accessible to me.

I should also mention that shortly after Mr. Cheeseman died the matter of carrying on the work of seeing the Manual through the Press was referred to the Board of Science and Art, and by its decision I was selected. I have felt fully the responsibility of the honour thus bestowed on me. The task has proved somewhat long and arduous, but I trust that the errors which I have failed to detect will not detract from the value or appearance of Mr. Cheeseman's work.

W. R. B. OLIVER.

A HISTORY OF BOTANICAL DISCOVERY IN NEW ZEALAND.

(Reprinted from the First Edition.)

The history of botanical discovery in New Zealand falls naturally and conveniently into two periods of almost equal duration. The first commences with the year 1769, in which Cook made his first visit, and closes with the establishment of British supremacy and the commencement of systematic colonization in 1840. During the seventy-one years comprised between these dates many voyages of discovery or survey in the South Pacific were undertaken by the British, French, or American Governments, during most of which New Zealand was visited. And, as naturalists or collectors were usually attached to these expeditions, it was through them that our first knowledge of the flora was obtained. During the same series of years several travellers of scientific attainments also visited New Zealand, such as the two Cunninghams, Dieffenbach, Bidwill, &c., all of whom formed collections of considerable importance. This period may therefore be appropriately called the period of investigation by visitors from abroad. That extending from 1840 to the present time can be just as correctly styled the period of investigation by naturalists resident in the colony.

Commencing with the voyages, the first in order of time, as well as in degree of importance, is Cook's first visit (1769–1770). For full details concerning this celebrated expedition, which has been well said "to have been the most momentous voyage of discovery that has ever taken place, for it practically gave birth to the great Australian colonies," I must refer the reader to Hawkesworth's "Cook's Voyages," Wharton's transcript of Cook's journal, and Hooker's "Journal of Sir Joseph Banks." For the purposes of this work the following sketch will be sufficient. Cook's ship, the "Endeavour," left England on the 26th July, 1768. For that period, she was unusually well equipped for scientific work. Sir Joseph Banks, one of the leading naturalists of his time, and a man of much influence and ample fortune, volunteered to accompany the expedition. At his own expense he provided the requisites for making collections in every department of natural science, and engaged Dr. Solander, four draughtsmen or artists, and a staff of servants to accompany him. The cost to Banks of these preparations has been estimated at £10,000. After rounding Cape Horn, and after a stay of nearly four months at Tahiti and other islands of the Society Group, Cook struck south-westwards across the Pacific. On Friday, the 6th October, 1769, he first sighted New Zealand, and at once stood in for the land. Delayed by calms and baffling winds, it was not until the afternoon of Sunday, the 8th October, that he anchored on the north-west side of a deep bay, to which he afterwards gave the name of Poverty Bay, and almost directly opposite the present town of Gisborne. Cook immediately landed, accompanied by Banks and Solander, but an unfortunate skirmish took place with the Maoris, one of whom was shot, and the party returned to the ship. The next morning a landing was made

in greater force, and some intercourse took place with the Maoris through the medium of a Tahitian interpreter. Their behaviour, however, was so threatening that it became necessary to fire upon them, and another man was killed and several wounded. Discouraged by this reception Cook once more re-embarked. The following morning another landing was effected, and Cook, together with Banks and Solander, strolled some little distance up the right bank of the Waikanae River. But the Natives again became troublesome, and a retreat had to be made to the landing-place. Seeing no hope of establishing a pacific intercourse, Cook returned to his vessel, and at daylight the following morning left the bay. Under the circumstances narrated above, it is obvious that little botanizing could be done. Banks, in his journal, laments that "We took leave of Poverty Bay, as we named it, with not above forty species of plants in our boxes, which is not to be wondered at, as we were so little ashore, and always upon the same spot. The only time when we wandered about a mile from the boats was upon a swamp, where not more than three species of plants were found."

After leaving Poverty Bay Cook followed the coast southwards, successively passing Table Cape, Portland Island, Hawke's Bay, and Cape Kidnappers, but nowhere making any attempt to land. On the 17th October, when off Cape Turnagain, he determined to return to the northwards, giving as a reason that there was "no likelyhood of meeting with a Harbour, and the face of the Country Visibly altering for the worse." On the 19th he repassed Poverty Bay, and on the 20th anchored in Anaura Bay, which he called "Tegadoo." Here the reception given by the Natives was all that could be desired, and Cook consequently remained until daylight on the 22nd, for the purpose, as he states, of giving "Mr. Banks an opportunity to Collect a little of the Produce of the Country." Banks, in his journal, says, "We ranged all about the bay, and were well repaid by finding many plants and shooting some most beautiful birds." Further on, he gives a description of the Maori cultivations, in which were planted "sweet potatos, cocos, and a plant of the cucumber kind," doubtless referring to the kumara, taro, and hue. Dr. Solander, in his manuscript volume of descriptions, presently to be referred to, enumerates ninety-eight species of plants as having been collected at "Tigadu." Among these were the first specimens of the beautiful *Clianthus puniceus*, which was found cultivated by the Natives near their dwellings.

On taking his departure from Anaura, Cook at first stood to the northwards, but the wind being unfavourable he determined to put into Tolaga Bay, where the Natives had informed him wood and water could easily be obtained for his ship. On the morning of the 23rd he accordingly anchored about a mile from a small cove just inside the southern point of the bay. Here a stay was made until the 30th October. The Natives were friendly and obliging, and an ample supply of wood and water was obtained. Both Banks and Solander passed most of their time on shore, and an excellent collection of plants was formed. With respect to the vegetation, Cook remarks, "The Tops and ridges of the Hills are for the most part barren, at least little grows on them but fern; but the Valleys and sides of many of the Hills were luxuriously clothed with woods and Verdure and little Plantations of the Natives lying dispers'd up and down the Country. We found in the Woods, Trees of above 20 different sorts; Specimens of each I took on board, as all of them were unknown to any of us. The Tree which we cut for firing was something like Maple and

yielded a whitish Gum. There was another sort of a deep Yellow which we imagin'd might prove useful in dyeing. We likewise found one Cabage Tree which we cut down for the sake of the cabage. The Country abounds with a great Number of Plants, and the woods with as great a variety of beautiful birds, many of them unknown to us." Altogether, Tolaga Bay appears to have left a favourable impression on the " Endeavour's " people. From the localities cited in Solander's manuscripts, it appears that about 160 species of plants were collected.

Leaving Tolaga Bay on the 30th October Cook made sail to the northwards. On the following day he rounded the East Cape, and passing Cape Runaway and White Island (which was evidently quiescent at that time) he coasted along the shores of the Bay of Plenty, having occasional intercourse with those Maoris who came off to him in their canoes, but making no attempt to land. On the 3rd November he was abreast of Tauranga, and on the 4th reached the entrance of Mercury Bay. Finding in this locality a secure harbour with plenty of wood and water, and being anxious to observe the transit of Mercury, which was to take place on the 9th, Cook brought his vessel to an anchor. During a stay of eleven days many plants were collected, figured, and described, the total number, reckoning from Solander's manuscripts, being 213. Among those which had not been previously observed was the Mangrove (*Avicennia officinalis*), which occurred in such abundance along the sides of the Whitianga River that Cook gave it the name of the " River of Mangroves." Through a curious misapprehension he states that the mangroves " produce a resinous substance very much like Rosin. . . . . We found it, at first, in small Lumps upon the Sea Beach, but afterwards found it sticking to the Mangrove Trees, and by that means found out from whence it came." The resinous substance was no doubt the now well-known kauri-gum, pieces of which are often drifted along tidal streams, and are not infrequently detained among the roots or lower branches of the mangrove. The kauri-tree itself does not seem to have been observed, either by Cook or by Banks and Solander, although common enough on the hills overlooking Mercury Bay. Probably they did not venture far enough from the coast to reach it.

After leaving Mercury Bay Cook continued to follow the coast-line, and, rounding Cape Colville, entered the Hauraki Gulf. Here he found himself surrounded by islands, and, not wishing to lose sight of the mainland, kept close under the western side of the Coromandel Peninsula. A short sail brought him to the entrance of the Thames River, where he anchored, almost directly abreast of the position where the Town of Thames now stands. On the following day, the 21st November, accompanied by Banks and Solander, he made a boat voyage up the Thames River for a distance of twelve or fourteen miles. A landing was effected on the west side of the river for the purpose of examining the kahikatea forest which still clothes its banks, and which had attracted Cook's attention at his anchorage. Describing the trees, he says, " We had not gone a hundred yards into the woods before we found a Tree that girted 19 feet 8 inches, 6 feet above the ground, and having a Quadrant with me, I found its length from the root to the first branch to be 89 feet; it was as streight as an Arrow, and Taper'd but very little in proportion to its length, so that I judged that there was 356 Solid feet of timber in this Tree, clear of the branches. We saw many others of the same sort, several of which were Taller than the one we measured, and all of them

very stout; there were likewise many other sorts of very Stout Timber Trees, all of them wholy unknown to any of us. We brought away a few specimens, and at 3 o'Clock we embarqued in order to return." It is somewhat distressing to state that the historic tree mentioned above, after surviving one hundred and thirty years with unimpaired vitality, was wantonly cut down only a few years ago.

From the Thames River Cook's course was directed to Cape Rodney, and from thence northwards to Cape Brett, which was reached on the 27th November. Here contrary winds were met with, and it was not until the 29th that the cape was weathered, and an anchorage found in the Bay of Islands, where the "Endeavour" remained until the 5th December. During this time visits were made to several of the islands in the bay, and to the mainland; but as it was impossible to go far from the coast, along which the vegetation was by no means varied, not many plants were collected, only seventy-seven being credited to the locality in Solander's manuscripts.

Leaving the Bay of Islands, Cook continued his survey of the coast to the North Cape, where he met with fierce and prolonged gales of such exceptional character that three weeks were occupied in rounding it. He then proceeded southwards along the western coast, but its dangerously open character prevented him from making a close approach. He consequently failed to observe any of the harbours — Hokianga, Kaipara, Manukau, Kawhia, &c.—and, as no canoes were seen, there was no intercourse with the inhabitants. He passed Mount Egmont on the 13th January, entered Cook Strait on the 15th, and on the 16th anchored in Queen Charlotte Sound, in the northern portion of the South Island. In this locality he made a stay of three weeks, taking advantage of his visit to careen and clean his ship, to lay in a stock of wood and water, and to give his crew the welcome change of a diet of fresh fish and green vegetables. He remarks that Queen Charlotte Sound "is a collection of some of the finest harbours in the world," and that "the Cove in which we lay, called Ship Cove, is not inferior to any in the Sound, both in point of Security and other Conveniences." He also says that the land "consists wholly of high hills and deep Valleys, well stored with a variety of excellent Timber, fit for all purposes except Ship's Masts, for which use it is too hard and heavy." The collection of plants made was larger than that formed in any other locality, numbering 220 species.

Taking his departure from Queen Charlotte Sound on the 7th February, Cook first took a run northwards to Cape Turnagain, thus completing his survey of the North Island. He then turned to the south, passing down the east coast of the South Island. On the 17th February he rounded Banks Peninsula, which he took to be an island; on the 25th February he was off Cape Saunders; and on the 10th March he was abreast of the south end of Stewart Island, which he assumed to be a peninsula connected with the mainland by a narrow neck. On the 13th he passed the entrance to Dusky Sound, from whence he followed the western coast northwards, reaching Cape Farewell on the 24th March, and thus completing the circumnavigation of the South Island. On the 27th he put into Admiralty Bay, to the west of Queen Charlotte Sound, for the purpose of again renewing his stock of wood and water, and on the 31st he left New Zealand, steering a course for the east coast of Australia.

In 1771 Cook returned to England. The natural-history collections, which were the property of Sir Joseph Banks, contained a large amount

of material; but no work has ever been published treating of them as a whole. The plants had for the most part been fully described by Solander at the time of collection, and coloured drawings prepared of many of the species. Little additional labour was therefore required to prepare the results for publication. Evidently Banks intended that this should be done, for at his own expense he had 700 plates engraved on copper, and Solander's manuscript descriptions were revised and systematically arranged. The New Zealand portion, which was entitled "Primitiae Florae Novae-Zealandiae," contained descriptions of nearly 360 species, illustrated by over 200 plates, and was practically ready for the press. Why it was not actually published is by no means clear, but the suggestion has been made that publication was at first delayed by the preparations made by Banks and Solander to accompany Cook in his second voyage, a project which was ultimately abandoned; and that a more serious interruption was caused by Solander's somewhat sudden death in 1782. After his companion's decease Banks became more and more occupied with his duties as President of the Royal Society, and as an organizer and promoter of scientific research, and the idea of publication appears to have been abandoned. As stated in the preface, a typewritten copy of Solander's descriptions and a set of impressions from the plates have been liberally furnished by the Trustees of the British Museum for use in the preparation of this work. Of their scientific value I cannot speak too highly; and it is a matter for regret that they were not presented to the world 125 years ago. It is, however, some satisfaction to know that the botanical results of the whole voyage are now, after this long delay, being issued under the auspices of the British Museum, and under the careful editing of Mr. Britten.

On the 9th April, 1772, Cook left England for his second voyage, the expedition consisting of two ships, the "Resolution" under his own command, and the "Adventure" under that of Captain Furneaux. John Reinhold Forster and his son George Forster, both well-known botanists, accompanied him in the capacity of naturalists, and were joined at the Cape of Good Hope by Dr. Sparrmann, also a botanist of repute, and a former pupil of Linnaeus. After several months had been spent in an unsuccessful search for a southern continent Cook made sail for the south of New Zealand. During the voyage he was accidently separated from the "Adventure" and, failing to rejoin her, put into Dusky Sound, the entrance to which had been noticed in his first voyage. He remained there from the 26th March, 1773, to the 1st May, mainly for the purpose of refitting, and to give his crew a rest after the months of incessant buffeting experienced in high southern latitudes. During his stay many boat voyages were made to various parts of the Sound, and a careful survey was made of it. The two Forsters devoted much of their time to botanizing, but their collections were by no means so large as might have been expected, considering what a productive locality Dusky Sound has proved to be in later years. Among the plants gathered were *Olearia operina*, *Celmisia holosericea*, *Gentiana saxosa* and *G. montana*, and *Cordyline indivisa*.

From Dusky Sound the "Resolution" proceeded northwards to Queen Charlotte Sound, which was reached on the 18th May. Here she rejoined the "Adventure," which had arrived on the 7th April. Both vessels left on the 7th June, in the first place for a cruise to the south-east of New Zealand, in further search for a southern continent, and then for eastern Polynesia. In October Cook again directed his course to New Zealand. Making the coast of the North Island near Table Cape, he steered to the

south, stopping near Cape Kidnappers to give pigs and fowls to some Natives that came off to his ship. Up to this time the two vessels had been in company, but off Cape Palliser exceptionally severe weather was encountered, and they separated. The "Resolution" proceeded to Queen Charlotte Sound, which had been appointed a place of rendezvous, and remained there waiting for her consort from the 3rd November to the 25th, when Cook left for a cruise to the Antarctic Ocean. Five days after his departure the "Adventure" arrived, and remained until the 23rd December. During this stay an unfortunate dispute arose with the Maoris, which led to the massacre of a boat's crew of ten men. After a year's explorations in various parts of the Pacific Cook once more returned to New Zealand, anchoring in his favourite resort, Queen Charlotte Sound, on the 19th October, 1774. His stay was but short, and on the 10th November he left on his return voyage, reaching Plymouth on the 30th July, 1775.

From the above sketch it will be seen that the only localities botanized in during Cook's second voyage were Queen Charlotte Sound, which had already been explored by Banks and Solander, and Dusky Sound. But a much longer period was spent in harbour and on shore than during the previous voyage, and the collections ought to have been quite as extensive. Instead of this, they were much smaller, the total number of flowering-plants and ferns not exceeding 180 species. Sets of these were distributed to several public and private herbaria—unfortunately, in a somewhat careless manner as regards the nomenclature, thus causing many mistakes and much confusion. Within twelve months after their return the two Forsters conjointly issued a work entitled "Characteres Genera Plantarum," in which seventy-five new genera were shortly described and illustrated, thirty-one of them being from New Zealand. The book is interesting on account of containing the first published descriptions of New Zealand plants, but otherwise is most disappointing. The descriptions are short and meagre, and the illustrations so badly executed as to be practically useless. In 1786 George Forster published his "Florulae Insularum Australium Prodromus," which contains diagnoses of 594 species, about 170 of which have New Zealand assigned as a habitat. As in the preceding work, the descriptions are short and unsatisfactory, and usually quite insufficient for the proper identification of the species. In the same year he also issued a little tract entitled "De Plantis Esculentis Insularum Oceani Australis Commentatio Botanica," which includes full descriptions and much curious information respecting the esculent plants, fifty-four in number, observed during the voyage, fourteen of which were from New Zealand. These three publications, together with a short essay, "De Plantis Magellanicis et Atlanticis," which contains no reference to New Zealand, appear to be the whole of the matter written by the Forsters respecting the botany of Cook's second voyage.

Cook's third and last voyage can be passed over with a few words. He left England on the 12th July, 1776, and after visiting the Cape of Good Hope, Kerguelen Island, and Tasmania, reached his favourite anchorage in Queen Charlotte Sound on the 12th February, 1777, this being his fifth visit to the locality. His stay was brief, and on the 25th February he finally left New Zealand. Cook's surgeon, Mr. W. Anderson, had some knowledge of natural history, and his description of Queen Charlotte Sound, printed in Hawkesworth's "Cook's Third Voyage" (vol. i, p. 145), contains an excellent account of the vegetation. His collections, however, were small and unimportant.

In 1791 Captain Vancouver, in command of the "Discovery," accompanied by Captain Broughton in the "Chatham," visited Dusky Sound, making a stay of nearly three weeks. The surgeon to the expedition, Archibald Menzies, devoted himself to the higher cryptogams, and made a large collection of ferns, mosses, and *Hepaticae*. Many of his specimens were figured by Sir W. J. Hooker in the "Musci Exotici" or "Icones Filicum," together with a few flowering-plants in the "Icones Plantarum." A set of his collections is in the British Museum Herbarium, and another at Kew.

The first of the French voyages of discovery to touch at New Zealand was that of Captain De Surville, in the "Saint Jean Baptiste." De Surville arrived off Doubtless Bay in December, 1769, only three days after Cook had passed the same locality on his way to the North Cape. He remained three weeks at anchor in Mangonui Harbour, and was most hospitably treated by the Maoris, a hospitality which he returned by burning one of their villages and destroying their canoes, apparently because he suspected them of stealing a boat which had accidentally got adrift. I cannot learn that any natural-history collections were made during this visit.

In 1772 an expedition consisting of two vessels, the "Mascarin" and the "Marquis de Castries," under the command of Marion du Fresne and Duclesmeur, arrived off Cape Egmont. Proceeding northwards, and failing to find a harbour, the ships rounded the North Cape, and eventually anchored in the Bay of Islands, where a stay of over two months was made. Marion and his people were welcomed with such apparent cordiality by the Maoris that no suspicions of treacherous conduct were aroused. They were thus quite unprepared for the sudden attack which was made upon them, and which resulted, as is well known, in the massacre of Marion and nearly thirty of his crew. A graphic account of this unfortunate incident is given in the journal of Crozet, upon whom the command devolved after Marion's death. The same journal contains and excellent sketch of the natural productions of the country, in which many references are made to the vegetation; but, as in De Surville's expedition, no collections were made.

In 1824 the surveying corvette "Coquille," under the command of Captain Duperrey, arrived at the Bay of Islands, and remained for nearly a fortnight. Two naturalists were on board, Lieutenant D'Urville (afterwards Admiral D'Urville), an ardent botanical collector, and M. Lesson, both of whom made collections of some extent. In the beginning of 1827 D'Urville revisited New Zealand in command of the same vessel, renamed the "Astrolabe." He was again accompanied by Lesson, and also by Quoy and Gaimard as zoologists. First sighting the coast of the South Island near Greymouth, he proceeded northwards, and, rounding Cape Farewell, entered Cook Strait. A secure anchorage was found on the west side of Tasman Bay, between the mouth of the Motueka River and Separation Point, in which he remained for a week, forming important collections. He then crossed to the east side of Tasman Bay, and discovered the strait separating D'Urville Island from the mainland, known to this day as "the French Pass." Several days were occupied in surveying this passage, during which time both the botanical and zoological collections were added to. D'Urville then sailed through Cook Strait, and followed the east coast of the North Island to Tolaga Bay, where a brief stay was made. Continuing his voyage, he rounded the East Cape, crossed the Bay of Plenty,

and, passing to the north of the Great Barrier Island, arrived at Whangarei Heads, where he remained for two or three days. Turning southwards, he passed Cape Rodney and Tiritiri Island, and anchored at the entrance to Auckland Harbour, of which little was known at that time. He landed on both the northern and southern banks of the Waitemata, and, having sent a boat up the Tamaki River as far as the present township of Otahuhu, some of his men were guided by the Maoris across the narrow isthmus to the head of the Manukau Harbour. D'Urville left Auckland Harbour by the Waiheke Channel, passed between the Great and Little Barrier Islands, and after a cruise to the North Cape returned to the Bay of Islands. On the 18th March he finally left New Zealand, having spent a little more than two months on its shores.

After the "Astrolabe" had returned to Europe the scientific results of the voyage were published in elaborate style under the auspices of the French Government. The botanical portion was undertaken by A. Richard, one of the leading botanists of his time, and was issued in 1832, under the title of "Essai d'une Flore de la Nouvelle Zélande," accompanied by a folio atlas of plates. Richard included not only the species collected in the two expeditions of Duperrey and D'Urville, but also most of those obtained by Forster in Cook's second voyage. Altogether 380 species are enumerated, 211 of which are phaenogams and 169 cryptogams, 51 of the latter being ferns. It is the first publication dealing with the flora of New Zealand as a whole, and possesses considerable merit, so much so that it is to be regretted that so little use of it has been made by New Zealand botanists.

Early in the nineteenth century a trading intercourse sprang up between the North Island and Sydney, and by degrees a small European settlement began to form at the Bay of Islands. This led to occasional visits from colonial botanists and explorers, and much additional information was thus obtained respecting the flora. In 1825 Mr. Charles Fraser, Government Botanist and Superintendent of the Sydney Botanical Gardens, landed for a day in the Bay of Islands, and made a small collection of plants. In 1826 his successor, the indefatigable Allan Cunningham, paid a visit of over five months' duration. Through the assistance afforded by the resident missionaries he was able to explore the greater part of the Bay of Islands district, and to visit Whangaroa and Hokianga, making extensive and valuable collections. In 1833 his brother, Richard Cunningham, arrived in H.M.S. "Buffalo," which had been sent to New Zealand by the Admiralty to obtain a cargo of kauri spars for experimental purposes. He also spent nearly five months in travelling through the Bay of Islands, Whangaroa, and Hokianga districts. In 1838 Allan Cunningham paid a second visit, remaining at the Bay of Islands through the whole of the winter and early spring; but the precarious state of his health prevented all active work, and his collections were consequently small. He returned to Australia in October, 1838, utterly exhausted and worn out, as his biographer says, "by twenty-five years of unwearied exertions and laborious travel," and, after lingering a few months, died at Sydney in June, 1839.

During a short visit to England Allan Cunningham had prepared for publication a sketch of the flora of New Zealand, entitled "Florae Insularum Novae-Zealandiae Precursor; or, A Specimen of the Botany of the Islands of New Zealand." The first part of this work appeared in the "Companion to the Botanical Magazine," vol. ii; the remaining portions in the "Annals and Magazine of Natural History," vols. i to iv.

In it Cunningham enumerates the whole of the species published by Forster and A. Richard, including also some of Banks and Solander's plants which had been described by other botanists. To these he adds the new species discovered during his first visit and that of Richard Cunningham. Altogether the Precursor includes the names of 639 species, of which 394 are phaenogams and 245 cryptogams. Although containing much valuable information, it bears evident marks of hasty preparation, and can hardly be considered an adequate memorial of its enthusiastic and talented author. The herbarium of both the Cunninghams is now preserved at Kew.

Mr. J. C. Bidwill visited New Zealand for the first time in 1839, and after a short stay at the Bay of Islands proceeded to the Bay of Plenty, from whence he journeyed to Rotorua and Taupo. Crossing Lake Taupo he reached Lake Rotoaira; and, using the Native village there as a base of operations, succeeded in exploring the spurs of Tongariro and in ascending the cone of Ngauruhoe, being the first European to accomplish the feat. He returned by way of Rotorua, Tauranga, and the Thames Valley. His collections, which were forwarded to Sir W. J. Hooker, were the first made in the mountainous interior of the North Island, and contained several interesting discoveries, as *Veronica tetragona*, *Dacrydium laxifolium*, *Senecio Bidwillii*, *Dracophyllum recurvum*, &c. A few years later he visited the mountains of Nelson, forming a very interesting collection of mountain-plants, which were also forwarded to Sir W. J. Hooker.

In the years 1839–40–41 Dr. Ernest Dieffenbach made extensive travels in New Zealand as naturalist to the New Zealand Company. In addition to an examination of the whole of the northern peninsula, from the North Cape to Auckland, he travelled along the western coast to Raglan and Kawhia, and, crossing to the Waipa Valley, followed the western bank of the Waikato River to Lake Taupo. A project to ascend Tongariro and Ruapehu was frustrated by the opposition of the Maoris, and he returned to Auckland by way of Rotorua, Tauranga, and the Thames Valley. During another journey he explored a large part of the Taranaki District, and was the first European to ascend Mount Egmont. He also visited Wellington, Wanganui, and Kapiti Island, and spent some time in the exploration of Queen Charlotte Sound, Cloudy Bay, and the whaling-stations on the north-east coast of the South Island. Finally, he paid a visit to the Chatham Islands, and brought away the first plants collected in that outlying dependency of the colony. On his return to England Dieffenbach published his "Travels in New Zealand," the two volumes of which are replete with interesting matter relating to the flora, fauna, and Native inhabitants. His botanical collections were presented to the Kew Herbarium, but, according to Sir J. D. Hooker, they are "most scanty compared with the great extent of interesting ground he passed over."

In July, 1840, the French corvette "L'Aube" arrived at the Bay of Islands, and after a brief stay proceeded to Akaroa, remaining there until November, 1841. In January, 1842, "L'Aube" was replaced by "L'Allier," which was stationed at Akaroa until January, 1843. The surgeon attached to these two vessels, M. E. Raoul, made excellent collections, mainly at Akaroa, and, as he was the first botanist to investigate the flora of the eastern side of the South Island, many of his plants were altogether new. Raoul first of all published his discoveries in the "Annales des Sciences Naturelles" (Series III, vol. ii), but subsequently he prepared a work of

wider scope under the name of "Choix de Plantes de la Nouvelle Zélande," illustrated with thirty beautiful plates. In it he reprints the descriptions previously published in the Annales, and gives an enumeration of the known species of the flora, including about 950 species, of which rather more than 500 are flowering-plants. But he accepted all Cunningham's species, many of which were not well founded, and also included no small number of synonyms and introduced plants. If these are eliminated his list will be reduced to under 800. Raoul's services to New Zealand botany have been well commemorated in the genus *Raoulia*, dedicated to him by Sir J. D. Hooker.

In the year 1837 an elaborately organized expedition, consisting of the corvettes "Astrolabe" and "Zélée," under the command of Admiral D'Urville, was despatched by the French Government for the purpose of exploration in the Antarctic regions. The expedition visited the Auckland Islands during 1839, when M. Hombron, who acted as botanist, made a collection of plants, the first formed in the locality. The official record of the voyage, which appeared under the title of "Voyage au Pôle Sud et dans l'Océanie," contains a folio atlas of botanical plates prepared under the direction of M. Hombron, and two volumes of descriptive matter; one including the Cryptogamia, by Montaigne, the other the phaenogams, by Decaisne. Drawings and descriptions were given of several species from the Auckland Islands; but all, or nearly all, had been already described in Hooker's "Flora Antarctica," presently to be alluded to.

About the same period the well-known American Exploring Expedition, under the command of Captain Wilkes, visited both the Bay of Islands and the Auckland Islands. Several naturalists were attached to the expedition, and collections of considerable importance were formed. After Wilkes's return, and after many delays, the botanical collections were entrusted to the eminent American botanist, Asa Gray. An account of the phaenogams ultimately appeared (in 1854) in two volumes quarto, with a folio atlas of 100 plates. The number of New Zealand plants enumerated is not large, but Asa Gray's critical and descriptive remarks are in many cases of considerable value.

We now arrive at the Antarctic Expedition of Sir James Clark Ross, which left England in September, 1839, for the purpose of investigating the phenomena of terrestrial magnetism in high southern latitudes, and of prosecuting geographical discovery in the Antarctic regions. It consisted of two vessels, the "Erebus," commanded by Ross, and the "Terror," under Captain Crozier. To the first-mentioned vessel Dr. (now Sir J. D.) Hooker was attached as assistant surgeon and naturalist, whilst Dr. Lyall served in a similar capacity on the "Terror." After calling at the Cape of Good Hope, Kerguelen Island, and Tasmania, the expedition arrived at the Auckland Islands on the 20th November, 1840, remaining until the 12th December. On the 13th December it reached Campbell Island, leaving again on the 17th for a cruise to the Antarctic Circle and the south polar regions. Although the Auckland Islands had been visited by D'Urville and Wilkes the previous year, nothing had been published respecting the vegetation, and with characteristic ardour Hooker devoted himself to its exploration. The luxuriance of the flora and the relatively large proportion of plants with brilliant and conspicuous flowers at once attracted attention. Hooker goes so far as to say, when writing of *Bulbinella Rossii*, "Perhaps no group of islands on the surface of the globe, of the same limited extent and so perfectly isolated, can boast of

three such beautiful plants, peculiar to their flora, as the *Pleurophyllum speciosum*, *Celmisia vernicosa*, and the subject of the foregoing description." Under such circumstances the scrutiny given to the vegetation was keen and almost exhaustive, as evidenced by the fact that but few additions have been made by later explorers. The first volume of the "Flora Antarctica," prepared by Hooker after his return to England, and issued in 1844, is confined to the flora of the Auckland and Campbell Islands. It contains descriptions of 100 species of flowering-plants and twenty ferns and fern-allies, together with numerous mosses, *Hepaticae*, and other cryptogams, and is illustrated with eighty beautifully prepared plates, fifty-six of which are of phaenogams. Altogether, it is a splendid monument of painstaking exploration and research, and it seems almost incredible that the observations and material on which it is founded should have been collected in less than a month.

After the discovery of Victoria Land in the summer of 1840–41 Sir James Ross returned to Tasmania, proceeding from thence to the Bay of Islands, which was reached on the 14th August, 1841. Here the expedition remained until the 23rd November. During this period Sir J. D. Hooker was actively engaged in collecting materials for his projected "Flora of New Zealand," receiving much assistance from Mr. Colenso and other residents. He remarks that his collections "contained no novelty amongst flowering-plants not known to Mr. Colenso and Dr. Sinclair, with whom I spent many happy days. Amongst cryptogamic plants I collected much that was then new, but most of the species have since been found elsewhere."

With the departure of the Antarctic Expedition in 1841 the first period of botanical discovery in New Zealand—that of investigation by visitors from abroad—may be said to have closed; for, although several scientific expeditions, such as the "Novara," "Challenger," &c., have since visited the colony, they have done little in the way of botanical research. Since 1841 the advance which has been made is almost wholly due to the efforts of the colonists themselves.

The foremost place among resident botanists and explorers must be granted to the Rev. W. Colenso, both on account of the number and variety of his discoveries, and the ardour with which, for a period of no less than sixty-five years, he continued to observe and to collect facts and specimens in almost all branches of natural science, always giving the leading place to botany. Arriving in New Zealand in 1834 he was induced, first by the visit of the illustrious Darwin in the "Beagle" in 1835, and later by Allan Cunningham in 1838, to take up the study of the botany of his adopted country, forwarding his specimens from time to time to Sir W. J. Hooker at Kew. At first his collections were confined to the district between Whangarei and the North Cape, but he soon enlarged his field of operations. Space will not permit of a full account of his many journeys, which practically covered the whole length of the North Island, but the following were the most important. In 1841–42 he travelled on foot from Hicks Bay to Poverty Bay, and from thence inland through the rugged and almost inaccessible Urewera country to Lake Waikaremoana, which he was the first European traveller to reach. He then crossed the Te Whaiti Mountains to Ruatahuna, from whence he proceeded to Rotorua and Tauranga. Striking inland again, he followed the upper Thames Valley to its head, and, crossing to the Waikato River, canoed a hundred miles down the river to its mouth.

From thence he followed the west coast to the Kaipara Harbour, then again made for the east coast at Mangawai, finally reaching the Bay of Islands by way of Whangarei and Whangaruru. In 1843 he journeyed from Hicks Bay to Poverty Bay, and thence by sea to Castle Point. From that locality he proceeded to Ahuriri (Hawke's Bay) and the Wairoa River, which he ascended to Waikaremoana, returning by way of Rotorua and Tauranga. In 1844 he transferred his residence from the Bay of Islands to Hawke's Bay, and in the following year made his first expedition to the summit of the Ruahine Range, finding there a harvest of previously unknown alpine and subalpine plants. In 1847 he travelled by way of Titiokura and the Mohaka River to Taupo and inland Patea, passing along the flanks of Tongariro and Ruapehu, and returning to Hawke's Bay over the Ruahine Range, which he was the first European to cross. These journeys and many others, all made on foot, with a few Native companions only, and often under circumstances of great privation and no little danger, are evidence of the ardour and enthusiasm with which Mr. Colenso carried on his botanical explorations in the early days of the colony. Nor did his zeal diminish with age, for the "Transactions of the New Zealand Institute" contain papers written by him describing plants collected during a journey made to the flanks of the Ruahine Range in his eighty-fifth year. In addition to numerous writings on the Maori race, on which he was for many years the chief authority, Mr. Colenso contributed no less than fifty-nine papers on botanical subjects to the "Transactions of the New Zealand Institute." Very few volumes, from the foundation of the Institute to the time of his death, are without a communication from his pen. It is true that in his later descriptive writings he adopted views as to the circumscription of species which are in conflict with those held by all other New Zealand botanists, and thus introduced a vast number of synonyms into the flora; but that is a circumstance which must not detract from the recognition of his undoubted services to the botany of New Zealand.

Dr. Andrew Sinclair was originally a surgeon in the Royal Navy, and first became known as a botanist from the collections he made while attached to the surveying expedition of H.M.S. "Sulphur" to the Pacific coasts of North and South America. He first visited New Zealand in 1841, during the stay of the Antarctic Expedition at the Bay of Islands, and accompanied Sir J. D. Hooker and Mr. Colenso in numerous botanical expeditions. Returning to Australia, he met with Captain Fitzroy, who was then on his way to New Zealand as Governor, and who engaged him as private secretary. Not long after his arrival in the colony he was appointed to the post of Colonial Secretary, which he retained for several years. His leisure time was almost entirely devoted to botanical pursuits, and he collected largely in most parts of the North Island, transmitting copious suites of specimens to Kew, where they constituted a large part of the material used by Hooker in the elaboration of the "Flora Novae-Zealandiae." After the establishment of parliamentary government in New Zealand Dr. Sinclair vacated his position, and after a brief sojourn in England returned to New Zealand, with the intention of devoting himself to botanical work. After a short stay in Auckland he proceeded to Nelson, where he made important collections, adding many species to the alpine flora. He then repaired to Canterbury, and joined the late Sir Julius Haast in the geological and botanical survey then being made of the Southern Alps. There, in the year 1861, he was unfortunately drowned in an

imprudent attempt to ford the Rangitata River. Although he never published anything of importance on New Zealand plants, his name will always be remembered as one of the pioneers of botanical discovery in the colony.

In the years 1847–51, H.M.S. "Acheron," under the command of Captain Stokes, was engaged in the survey of the coast-line of New Zealand, and especially of the western and south-western portions. Captain Stokes was accompanied as surgeon-naturalist by Dr. Lyall, who had served in a similar capacity in H.M.S. "Terror" in the Antarctic Expedition, and who made large collections, especially of Cryptogamia. Milford Sound, Chalky Inlet, Dusky Bay, Preservation Inlet, and both shores of Foveaux Strait were the chief localities botanized in by Lyall during this expedition. Among the plants collected were the first specimens of the magnificent *Ranunculus Lyallii*.

In 1853 there appeared the first volume, containing the flowering-plants, of Sir J. D. Hooker's "Flora Novae-Zealandiae"; the second volume, including the cryptogams, following in 1855. The publication of this important work, in every way worthy of the reputation of its distinguished author, marked a new era in the history of the botany of New Zealand. For the first time the student was provided with an account of the flora characterized by aptness of description and accuracy of detail, and prepared by a botanist who had not only studied and collected a large proportion of the species in their native habitats, but whose position gave him ample opportunities of examining the material upon which the publications of his predecessors were founded. Under such advantages the synonyms and false species incorrectly included by previous writers disappeared, and the flora assumed more of its real proportions and extent. Altogether, the Flora contains descriptions of 1,767 species, or more than double the number given in the last previous enumeration, that of Raoul in the "Choix de Plantes." Of the total number, 731 are flowering-plants and 119 ferns or fern-allies, the remainder falling into other orders of Cryptogamia. The value of the work is much enhanced by the 130 carefully prepared plates which accompany it, and by the philosophic Introductory Essay dealing with the affinities and distribution of the species.

The eleven years subsequent to the publication of the Flora formed a period of great activity in botanical research in the colony. This was mainly due to the rapid settlement of the South Island, which led to the exploration of the central range of mountains, from Nelson to Otago, and the consequent discovery of the rich alpine flora existing thereon. The earliest worker in this field was Sir D. Monro, the first of whose contributions was received at Kew while the Flora was in progress. He explored a large part of north-eastern Nelson and Marlborough, making many capital discoveries, such as the magnificent *Olearia insignis*, *Helichrysum coralloides*, *Celmisia Monroi*, *Senecio Monroi*, &c. His sole publication, so far as I can learn, is an interesting essay on the "Geographical Botany of Nelson and Marlborough," printed in the first volume of the "Transactions of the New Zealand Institute."

Mr. W. T. L. Travers arrived in Nelson in 1849. About 1854 he took up the study of the alpine flora of the South Island, making many excursions into remote and little-explored districts, and forming copious collections, the whole of which were forwarded to Kew. Among the localities botanized over by him were the upper Buller Valley, including

Lakes Rotoiti and Rotoroa; the whole of the Wairau Valley, from the mouth of the river to its sources in the rugged Spenser Mountains; the upper Clarence Valley, with its tributaries; the Waiau and Hurunui Valleys, with the adjacent mountains; also the Canterbury Plains and various parts of Banks Peninsula. His discoveries included many singular and prominent species, and the genus *Traversia* was named in his honour by Sir J. D. Hooker. He contributed many papers and addresses more or less relating to the botany of the colony to the "Transactions of the New Zealand Institute," and was an earnest and assiduous supporter of botanical research up to the time of his death in 1903.

The well-known geologist and explorer Sir Julius Haast first landed at Auckland in 1858. Meeting Dr. Hochstetter, the geologist to the "Novara" expedition, he travelled with him through the greater part of the interior of the North Island, subsequently visiting portions of the Nelson District. After Hochstetter's departure, he accepted an engagement from the Nelson Provincial Government to explore the western and southern portions of the province, a work which occupied the greater portion of 1860, and during which he became familiar with the alpine vegetation of that part of the colony. In the following year he was appointed geologist for the Province of Canterbury, and at once commenced a series of expeditions into the then little-known Southern Alps for the purpose of studying their geology and physical structure, and of forming botanical and zoological collections. The botanical results, with which we are alone concerned, proved to be most important, and cast a flood of light on the nature and distribution of the alpine flora of the colony. I quite concur with Sir J. D. Hooker's opinion that it is difficult to imagine how Sir Julius Haast, with so many and such arduous duties as surveyor and geologist, could have personally effected so much for botany as he has done. Most of his botanical work was performed in the years between 1860 and 1870, but his interest in the subject remained undiminished until his death in 1887. His name is appropriately commemorated in the genus *Haastia*, the three or four species of which rank amongst the most curious and remarkable in the flora. His collections were either forwarded to Kew or distributed among European museums, but few being retained in the colony.

Dr. Lauder Lindsay, a well-known British botanist, visited New Zealand in the summer of 1861–62, and spent nearly four months in investigating the botany of eastern Otago, the district examined stretching from Dunedin to the mouth of the Clutha River, and inland to Tuapeka. The results of his journey were published in 1868 under the title of "Contributions to New Zealand Botany," with four coloured plates. Dr. Lindsay gives the total number of species collected at 612, of which 199 were phaenogams and 413 cryptogams. The memoir contains much information of value, the critical notes in particular being copious and interesting.

Mr. John Buchanan arrived in New Zealand prior to 1860, taking up his residence in Dunedin. He at once commenced an assiduous study of the native vegetation, making many important discoveries and collecting large suites of specimens. In 1862 he accepted the appointment of draughtsman and botanist to the Geological Survey of Otago, then being organized by Dr. (now Sir James) Hector. In the two or three years immediately following he accompanied Sir James Hector in a succession of adventurous journeys, during which a great part of central and western Otago was visited and explored. The collections made, which were mostly forwarded to Kew, contained many interesting and remarkable discoveries, among

which may be mentioned *Ranunculus Buchanani*, *Pachycladon novae-zea landiae*, *Hectorella caespitosa*, *Azorella exigua*, *Celmisia ramulosa*, *Veronica Buchanani*, &c. In 1865 Mr. Buchanan prepared his "Sketch of the Botany of Otago," the first local Flora issued in the colony, and a work of considerable merit, evidencing much industrious research. It was written at the request of the Commissioners of the New Zealand Exhibition of 1865, but was not actually published until 1869, when it appeared in the first volume of the "Transactions of the New Zealand Institute." On the establishment of the Geological Survey of New Zealand in 1866 he was appointed draughtsman and botanist, and removed to Wellington. He was successively engaged in botanical explorations of the North Auckland Peninsula, the Kaikoura Mountains, and Mount Egmont, some interesting notes on the two last-mentioned districts being printed in vol. x of the "Journal of the Linnean Society." In 1873 he published a valuable paper on the flora of the Wellington Provincial District; followed in 1874 by his "Flowering-plants and Ferns of the Chatham Islands," based on the collections made by Mr. H. H. Travers in 1863 and 1871. His most important work, published in 1880, is the "Indigenous Grasses of New Zealand," a folio volume of nearly two hundred pages, illustrated with sixty-four lithographic plates. It contains descriptions of the whole of the species then known to inhabit New Zealand, together with notes on their economic value, distribution, &c. Mr. Buchanan's contributions to New Zealand botany include forty separate papers, stretching through twenty volumes of the "Transactions of the New Zealand Institute." His last communication appeared in 1887, after which persistent ill health compelled him to give up botanical work. His death took place in 1898. His earlier collections were mostly forwarded to Kew, but in later years he formed an extensive herbarium for the Colonial Museum. His private collections, drawings and analyses, manuscript notes, &c., were bequeathed to the Otago University Museum.

No account of the history of botanical discovery in New Zealand would be complete without reference to the labours of Sir James Hector, the first Director of the Geological Survey and Manager of the New Zealand Institute. Arriving in the colony in 1861, his first duty was a geological and topographical exploration of the Province of Otago, a work which at that time involved many difficulties and hardships, and no small amount of danger. As previously mentioned, he obtained the services of Mr. Buchanan as collector and artist; but his own share in the work of botanical exploration was by no means small. That he fully grasped the leading features of plant-distribution in the South Island is evidenced by his essay "On the Geographical Botany of New Zealand," printed in the first volume of the "Transactions of the New Zealand Institute." After his removal to Wellington in 1866 the official duties appertaining to the Geological Survey and Colonial Museum, &c., left little time for botanical research; but he has never missed an opportunity of promoting the efforts of others. In fact, it can be said that from the time of his arrival in the colony up to the present day no attempt has been made to investigate its flora which has not had his countenance and support. His services to botanical science are fitly commemorated in the remarkable endemic genus *Hectorella*, and in the magnificent *Senecio Hectori*, one of the finest of the arborescent *Compositae* of the colony.

In 1863 Mr. H. H. Travers visited the Chatham Islands for the purpose of investigating its flora, at that time only known from a few plants collected

by Dr. E. Dieffenbach in 1840. He remained in the group for several months, and succeeded in forming large collections. On his return these were placed in the hands of the late Baron Mueller, of Melbourne, who published the results in his "Vegetation of the Chatham Islands," issued in 1864. In it Baron Mueller enumerates 129 species, of which sixty-two are phaenogams and sixty-seven cryptogams. Seven new species were described. The work forms an important addition to the botanical literature of the colony, but New Zealand botanists entirely repudiate the peculiar views entertained by the author respecting the circumscription of many of the species. For instance, he merges the whole of the species of *Veronica* found in the Chathams, together with thirteen others from New Zealand, into one collective species, to which he gives the new name of *V. Forsteri*. An excellent account of Mr. Travers's visit was contributed by himself to the first volume of the "Transactions of the New Zealand Institute." In 1871 he again visited the group, adding largely to his previous list. On this occasion his collections were worked out by Mr. Buchanan in his paper on "The Flowering-plants and Ferns of the Chatham Islands." Mr. H. H. Travers has also made collections on the Tararua Mountains, the Nelson mountains, and in other localities.

The important discoveries made in the interior of the South Island during the ten years following the publication of the "Flora Novae-Zealandiae," and the increasing demand for a concise and inexpensive account of the plants of the colony, induced the New Zealand Government to make arrangements with Sir J. D. Hooker for the publication of such a work. The first part, containing the flowering-plants and ferns, appeared in 1864, under the title of "Handbook of the New Zealand Flora"; the concluding part, comprising the mosses, *Hepaticae*, and lower cryptogams, followed in 1867. Its publication at once showed the great advance which had been made in elucidating the flora. The 731 species of flowering-plants and 119 ferns known in 1853 were increased to 935 and 135 respectively, an increase of nearly one-quarter; while the additional information obtained with regard to the distribution of the species was correspondingly large. The general plan of the work was in accordance with that recommended by Sir W. J. Hooker for a uniform series of floras of the British colonies, a project which has been to a considerable extent carried out. In point of execution the Handbook realized all the expectations which could have been entertained. The clearness and excellence of the descriptions and their general accuracy are most noteworthy, especially when it is considered that a large proportion of the species have been examined and described by the author alone. Its publication gave an immense impetus to the study of the indigenous vegetation, and it must always remain the foundation for future systematic work on the botany of the colony.

The number of persons who have collected plants or published memoirs relating to New Zealand botany during the forty years which have elapsed since the publication of the Handbook is so large that I can only allude to the chief workers here. The first place must be accorded to Mr. T. Kirk, both from the number of his discoveries and the importance of his publications. Arriving in the colony in 1863 he at once devoted himself to its botany, his first discoveries being briefly mentioned in the appendix to the second part of the Handbook. For ten years after his arrival he resided in Auckland, his chief explorations during that period being that of the Great Barrier Island in 1867, of the north-eastern coast of the northern

peninsula in 1868, of the Thames goldfields in 1869, of the Waikato district in 1870, and of the Rotorua and Taupo districts in 1872. Among the numerous species added to the flora by these journeys are the following: *Pittosporum Kirkii*, *Pseudopanax discolor*, *Coprosma arborea*, *Olearia Allomii*, *Dacrydium Kirkii*, *Phyllocladus glauca*, and *Isoetes Kirkii*. In 1874 Mr. Kirk removed to Wellington, occupying firstly the position of Lecturer on Natural Science at Wellington College, and at a later date that of Chief Conservator of State Forests. In the performance of the duties of the latter office he travelled through the greater part of both the North and South Islands, and these journeys were always employed to the furtherance of botanical science. After his retirement from the State Forests Department he made a lengthened exploration of Stewart Island, detecting several novelties, among them the superb *Olearia Traillii*. In 1890 he paid a visit to the Auckland and Campbell Islands, adding several species to their flora. During the same voyage he landed on The Snares and Antipodes Islands, the vegetation of which was previously quite unknown. The results of this expedition were embodied in a memoir printed in the Report of the Australasian Association for 1891. Mr. Kirk was a voluminous writer, and his contributions to New Zealand botany, mostly printed in the "Transactions of the New Zealand Institute," number nearly a hundred and fifty. His most important completed work is "The Forest Flora of New Zealand," issued in 1889. Its primary object was to diffuse a knowledge of the forest resources of the colony and to describe the chief methods of timber working and conversion. It contains much information on the economic value and uses of the New Zealand timbers, together with descriptions of the species, and is illustrated with 150 plates. In 1894 he was commissioned by the New Zealand Government to prepare a Flora of the colony, a work for which he had long been collecting material, and for which his wide personal knowledge of the vegetation of the country gave him exceptional qualifications. He entered upon the work with characteristic energy and ardour; but, unfortunately, his health gradually failed, and after several serious illnesses he died in March, 1897. That portion of his work which was in a sufficiently complete state at the time of his death, comprising the *Polypetalae*, and the *Monopetalae* as far as the *Compositae*, was issued from the Government Printing Press in 1899. Although printed without the advantage of the author's supervision, and without the introductory and supplementary matter usually given in such publications, it shows very clearly the loss which botanical science has suffered through his decease, and all students will regret that he did not live to complete the work for which he had made so many preparations.

I do not propose to say anything in regard to my own researches into the flora, beyond stating that they have extended continuously from the year 1870 to the present time, and include an examination of almost the whole colony, from the Kermadec Islands and the North Cape to Otago. A list of my papers on botanical subjects will be found in Mr. Hamilton's Bibliography, printed in vol. xxxvi of the "Transactions of the New Zealand Institute" (pp. 342–72).

In the years 1874 and 1875 Dr. Sven Berggren, of the University of Lund, Sweden, made an extended visit to New Zealand, travelling through the greater portion of both Islands, and making large collections, especially of cryptogams. The new species of flowering-plants were described and beautifully illustrated in a memoir published in 1877 in the "Proceedings of the University of Lund." The *Algae* have been worked out by Dr. Nordstedt

and the late Professor J. G. Aghard, while scattered memoirs relating to other orders of cryptogams have been published from time to time by Dr. Berggren himself.

From 1875 to the present time many important contributions to our knowledge of the flora of the colony have been made by Mr. D. Petrie, formerly Chief Inspector of Schools for Otago, and now holding a similar position in Auckland. During a residence of more than twenty years in Otago he sedulously investigated the vegetation of the eastern, central, and southern portions of the province, ascending many of the mountains, and forming large collections, especially of the rarer alpine and subalpine plants. Among the species added by him to the flora are *Ranunculus Berggreni*, *Carmichaelia compacta* and *C. Petriei*, *Coprosma virescens* and *C. Petriei*, *Olearia fragrantissima*, *Celmisia prorepens* and *C. Petriei*, *Myosotis Goyeni*, *Tetrachondra Hamiltoni*, *Veronica Petriei*, *Ourisia prorepens*, &c. In company with Mr. G. M. Thomson, he also visited Stewart Island, making several discoveries of interest, as *Actinotus bellidioides*, *Liparophyllum Gunnii*, *Carex longiculmis*, and *Ehrharta Thomsoni*. In 1895 Mr. Petrie published his "List of Flowering-plants indigenous to Otago," in which he catalogues the whole of the species, numbering over 760, observed by himself in Otago, giving at the same time particulars respecting the geographical and altitudinal range of the species. Altogether forty-four papers on botanical subjects are credited to Mr. Petrie in Mr. Hamilton's bibliography of New Zealand botanical literature.

Mr. G. M. Thomson, of Dunedin, has also done excellent service towards the elucidation of the botany of Otago. As already mentioned, he accompanied Mr. Petrie in an exploration of Stewart Island, and has collected largely in the vicinity of Dunedin. Several papers on Otago plants have been contributed by him to the "Transactions of the New Zealand Institute"; but probably the most interesting of his publications are two memoirs "On the Means of Fertilization among some New Zealand Orchids" (Trans. N.Z. Inst., xi, 418) and "On the Fertilization of New Zealand Plants" (*Ibid.*, xiii, 241). His work on the "Ferns and Fern-allies of New Zealand," issued in 1882, is an accurate and useful compendium, containing descriptions of all the known species. He is also the author of an "Introductory Class-book of Botany," which has been largely used in New Zealand schools.

Mr. J. F. Armstrong, for many years resident in Christchurch, has collected largely in the Province of Canterbury, and has published several papers of value. Among them are his "Sketch of the Flora of the Province of Canterbury" (Trans. N.Z. Inst., xii, 325) and "Synopsis of the New Zealand Species of Veronica" (*Ibid.*, xiii, 344), the latter publication containing descriptions of several new species. He also founded the genus *Corallospartium* for the reception of the remarkable plant first described by Sir J. D. Hooker under the name of *Carmichaelia crassicaulis*.

The Right Rev. W. L. Williams, Bishop of Waiapu, has for thirty years given special attention to the botany of the East Cape and Hawke's Bay districts, carefully noting the chief features of the vegetation, and collecting copiously. Among his discoveries may be mentioned the remarkable *Carmichaelia Williamsii*, one of the most local plants in the colony. Mr. Kirk's paper on the "Botany of the East Cape District" (Trans. N.Z. Inst., xxix, 509) is largely founded on Bishop Williams's specimens and notes. The collection of Maori plant-names is also a subject to which he has devoted much time and labour, and the list appended to this work is in great measure due to his friendly co-operation.

Mr. A. Hamilton, the present Director of the Colonial Museum, made an interesting collection of plants at Okarito in 1878, which included several novelties. Among them was the remarkable species described by Hooker as *Euphrasia disperma*, which has since been taken by Wettstein as the type of his genus *Anagosperma*. At a later date he botanized in the Hawke's Bay District, along the flanks of the Ruahine Range, and elsewhere on the eastern side of the North Island. In 1894 he visited Macquarie Island, and, although much hindered by exceptionally severe weather and other untoward circumstances, succeeded in adding considerably to our knowledge of the botany of the island. A list of the plants collected will be found in his "Notes on a Visit to Macquarie Island" (Trans. N.Z. Inst., xxvii, 559).

Mr. H. Hill, of Napier, has also collected largely in the Hawke's Bay and East Cape districts. Many of his specimens were communicated to Mr. Colenso, and were described by that gentleman as new species. He was the first to find the widely distributed *Peperomia reflexa* in the colony, and to rediscover the plant to which the name of *Veronica Colensoi* was originally applied by Hooker.

Mr. J. D. Enys, for several years resident at Castle Hill, in the middle portion of the Waimakariri basin, and a keen observer in many branches of natural science, made large collections in the Canterbury Alps in the years between 1874 and 1890. Among his discoveries may be mentioned *Ranunculus Enysii* and *R. paucifolius*, *Carmichaelia Enysii*, *Ligusticum Enysii*, *Botrychium lunaria*, &c. He also paid a visit to the Chatham Islands, bringing back a few interesting plants, among which were the first specimens of the endemic *Sonchus grandifolius*. His collections were for the most part communicated either to Mr. Kirk or myself.

Mr. James Adams, of Thames, has botanized in several parts of both the North and South Islands, making several interesting discoveries, the chief of which are *Celmisia Adamsii*, *Loranthus Adamsii*, and *Myosotis amabilis*. His papers on the "Botany of Te Aroha Mountain" (Trans. N.Z. Inst., xvii, 275), on the "Botany of Te Moehau" (*Ibid.*, xxi, 32), and the "Botany of Hikurangi Mountain" (*Ibid.*, xxx, 414) contain much interesting matter bearing on the distribution of the New Zealand flora.

Mr. F. R. Chapman (now Mr. Justice Chapman) has collected in Otago, and in 1890 visited the Auckland Islands and other islands to the south of New Zealand. His paper on "The Outlying Islands South of New Zealand" contains much valuable information of a botanical nature. He has also published two papers containing descriptions of certain new species of *Celmisia* (Trans. N.Z. Inst., xxii, 444; and xxiii, 407).

Professor J. H. Scott, of Dunedin, visited Macquarie Island in 1880. On his return he published an excellent account of the fauna and flora (Trans. N.Z. Inst., xv, 484), including a catalogue of the plants observed by him.

Among others who have interested themselves with New Zealand botany between the publication of the Handbook and the year 1895 may be mentioned the late Mr. Justice Gillies, Captain Hutton, T. H. Potts, C. Traill, S. Percy Smith, J. Rutland, P. Goyen, Captain G. Mair, A. T. Urquhart, H. Tryon, Archdeacon Walsh, T. W. Kirk, J. W. Hall, J. Tennant, and J. Baber.

In 1896 Dr. L. Diels, of Berlin, published in Engler's "Botanical Year-book" a paper entitled "Vegetations-biologie von Neu-Seeland," which deserves special mention on account of being the first attempt to

prepare an account of the flora of the colony from an oecological standpoint. Although based entirely on herbarium material and on the observations of other botanists and collectors, and consequently containing errors both of omission and commission, it is nevertheless a work of considerable originality and merit, and is well worth the attention of all students of the flora.

Since 1897 by far the most important contributions to our knowledge of the New Zealand flora have been made by Dr. L. Cockayne, and I regret that only brief mention can be made of his work here. In three papers "On the Seedling Forms of New Zealand Phanerogams and their Development" (Trans. N.Z. Inst., xxxi, 354; xxxii, 83; and xxxiii, 265) he describes with considerable detail the seedling leaves of many New Zealand plants, giving numerous figures, and in several instances tracing the gradual development of the foliage into the mature stage. Much information is given respecting the life-history of the species treated of, particularly in the genera *Carmichaelia* and *Veronica*. In the latter genus most of the species with scale-like leaves are very fully discussed, and their early foliage described. In a paper on the "Plant-geography of the Waimakariri River Basin" (Trans. N.Z. Inst, xxxii, 95) Dr. Cockayne makes the first attempt in the colony to treat the flora of a district from an oecological point of view. It was followed by his "Account of the Plant-covering of Chatham Island" (Trans. N.Z. Inst., xxxiv, 243), a publication which has thrown a flood of light on the nature and composition of the flora of this seldom-visited appanage of New Zealand. Lastly, the volume of Transactions for 1904 contains an elaborate paper on "An Excursion to the Southern Islands of New Zealand," in which he not only gives a detailed account of the "plant-formations" which make up the flora of the islands visited, but also contributes a list of the flowering-plants and ferns, and a sketch of the physiography, geology, climate, &c. These papers, which mark an entirely new epoch in the history of botanical investigation in New Zealand, will induce all students of the flora to look forward with impatience for the appearance of the general work on the plant-geography of New Zealand which it is understood that Dr. Cockayne has in preparation.

The very important researches made by Professor A. P. W. Thomas into the life-history of *Phylloglossum*, summarized in his "Preliminary Account of the Prothallium of *Phylloglossum*" (Proc. Roy. Soc., vol. lxix, pp. 285–91) deserve special mention; as also his suggestive paper on "The Affinity of *Tmesipteris* with the *Sphenophyllales*" (*Ibid.*, p. 343–50). The more detailed information promised with respect to both these communications will be eagerly looked forward to by New Zealand botanists.

During the last five years Mr. W. Townson, of Westport, has diligently explored the greater portion of south-western Nelson, from the Mokihinui River southwards to the Grey River, repeatedly ascending all the higher peaks of the coast ranges, as Mount Frederic, Mount Rochfort, Mount William, Mount Faraday, Mount Buckland, &c. He has also visited the Lyell Mountains, and many of the high peaks flanking the Buller Valley, as far up the river as Mount Murchison and Mount Owen. Most of this large district had never been carefully examined for plants, and Mr. Townson has consequently reaped a rich harvest of novelties, most of which are described in this work. Among them are *Aciphylla Townsoni*, *Celmisia dubia*, *Dracophyllum Townsoni* and *D. pubescens*, *Gentiana Townsoni*, *Veronica divergens* and *V. coarctata*, and the interesting new genus of

Orchideae which I have named in his honour *Townsonia*. Mr. Townson's specimens, which have been collected with great care and judgment, have been mainly forwarded to me for the purposes of this work, and have proved of much service in determining many questions relating to the geographical range of the species.

Mr. H. J. Matthews, the present head of the Forestry Department, has collected in many parts of the colony, adding largely to our knowledge of the range of the species, and obtaining a few novelties, notably the beautiful *Ranunculus Matthewsii*, described in the appendix to this work. He has also done excellent service in forming an extensive collection of living plants in his garden at Dunedin, especially of the rarer alpine and subalpine species. If this collection is maintained and extended it will prove invaluable for affording the means of leisurely study and comparison in difficult genera like *Veronica* and *Celmisia*, &c.

Mr. F. G. Gibbs, of Nelson, has done excellent work during the last ten years in the Nelson District, both on the Dun Mountain Range and on the chain of mountains extending northwards from Mount Arthur to Collingwood. Among his special discoveries are the curious *Veronica Gibbsii*, *Gentiana vernicosa*, *Celmisia Gibbsii*, &c.

The Marlborough District has been carefully and closely examined by Mr. J. H. Macmahon, who has made several finds of importance, especially in the neighbourhood of Mount Stokes. *Celmisia Macmahoni*, *C. Rutlandii*, and *Veronica rigidula* are interesting novelties first observed by him.

Mr. R. H. Matthews, of Kaitaia, has assiduously collected in most parts of Mongonui County, paying special attention to the *Orchideae*. He has added *Corysanthes Matthewsii* and *Chiloglottis formicifera* to the flora, and has succeeded in refinding *Pittosporum obcordatum*, which for sixty years after its original discovery by Raoul had eluded the search of New Zealand botanists.

Mr. H. Carse, now resident in Mongonui County, has botanized in several portions of the Auckland Provincial District. He has given special attention to the *Cyperaceae*, adding *Schoenus Carsei* and *Lepidosperma filiforme* to the list of those already known to occur in the colony. He was also the first to observe the curious little plant which I have provisionally described under the name of *Trithuria inconspicua*.

For several years Mr. F. A. D. Cox has carefully investigated the flora of the Chatham Islands, obtaining much new information relating to the distribution and environment of the species, and collecting a few novelties. His specimens, often accompanied by valuable notes, have been forwarded to Mr. Kirk, Dr. Cockayne, and myself.

Other recent workers are R. Helms, R. J. Kingsley, J. Dall, D. W. Bryant, Elsdon Best, E. W. Andrews, J. B. Simpson, H. Nairn, J. Annabell, J. B. Lee, and T. P. Arnold.

In the preceding sketch I have made no attempt to include the names of those authors who have published general works or special monographs in which New Zealand plants are casually mentioned or described. Nor have I mentioned the labours of those who have attended solely to the lower cryptogams, a branch of the flora which is outside the scope of the present work.

HISTORY OF BOTANICAL DISCOVERY IN NEW ZEALAND FROM 1905 TO 1924.

(By W. R. B. Oliver.)

Many investigators have contributed to the literature dealing with the flora of New Zealand since the publication of the first edition of the Manual. Progress has been made mainly along three lines: firstly, systematic botany, including the description of new species and the recording of the distribution of native plants; secondly, ecological botany, or the description of vegetation and the relations between plants and their environment; and, thirdly, plant anatomy, or the description of the minute structure of New Zealand plants. In addition to these several papers have been published on the origin of species in New Zealand, the chemical characteristics of the native flora, and on naturalized plants. The work of the past twenty years may conveniently be reviewed under these headings.

SYSTEMATIC BOTANY.

In his account of the botanical discovery published in the first edition of this Manual Mr. Cheeseman modestly passes over his own work with the remark that it had then extended over a period of about thirty-five years and included an examination of almost the whole of the Dominion.

Mr. Cheeseman's writings at the time of his death extended over a period of fifty-one years, during which time about one hundred contributions, mainly to botanical subjects, were published under his name. Under the circumstances in which the present edition of the Manual is issued I have thought it would be fitting to publish a complete list of his works, so have appended a classified bibliography following this account.

While Mr. Cheeseman was preparing the first edition of his work he suspended publication of smaller papers. In 1907 he began a series of articles, entitled "Contributions to a Fuller Knowledge of the Flora of New Zealand," and mainly supplementing the information given in the Manual. Simultaneously he published a number of smaller papers containing descriptions of new species. His main contribution, however, after the appearance of the first edition of the Manual was the quarto work in two volumes, "Illustrations of the New Zealand Flora," containing 250 plates with letterpress. The latter was written by Mr. Cheeseman. The plates were drawn by Miss Matilda Smith of the Kew Herbarium, while Mr. W. B. Hemsley supervised such portion of the work as was done in England. Two other important contributions from Mr. Cheeseman that have appeared within the last twenty years are the botany of the islands to the south of New Zealand, published in the "Subantarctic Islands of New Zealand," issued by the Philosophical Institute of Canterbury in 1909, and an account of the flora of Macquarie Island, published in the "Reports of the Australasian Antarctic Expedition" in 1919.

Altogether Mr. Cheeseman's works on New Zealand systematic botany, as may be judged from the list appended, occupy one of the foremost positions in the literature of New Zealand plants, while the present edition of the Manual will long remain the standard work on the flora.

Dr. D. Petrie has continued to publish regularly in the "Transactions of the New Zealand Institute" descriptions of new species and other information relating to native plants. He contributed the article on the Gramineae to the volume on the "Subantarctic Islands of New Zealand," and published an account of the plants of Mount Hector, and notes on the pollination of the puriri, and *Rhabdothamnus Solandri*.

Besides the ecological work mentioned in the next section, Dr. L. Cockayne has published a number of papers (Trans. N.Z. Inst.) recording the distribution of plants, describing new species, and offering critical remarks on others.

Mr. B. C. Aston has explored several of the mountain-ranges of New Zealand, and has published general accounts of the vegetation with lists of species of the Tararua and Ruahine Ranges and of Mount Tarawera. He has also published a useful list of the plants of the Wellington Province.

Mr. R. M. Laing has explored several portions of the Canterbury Province, and has published (Trans. N.Z. Inst.) accounts of the plants of the Spenser Mountains and Banks Peninsula. Together with Miss E. W. Blackwell, he published in 1906 a volume on the plants of New Zealand, describing and illustrating the more important species.

Mr. D. L. Poppelwell has visited many localities in Otago District and Stewart Island, and has contributed to the "Transactions of the New Zealand Institute" several papers dealing with different localities, including the Eyre Mountains, Hokonui Hills, Ben Lomond, and the Routeburn, Makarora, and Hollyford Valleys.

Mr. J. Crosby Smith has also done much work in Otago, and has published an account of Lake Hauroko district and a list of the plants of Southland.

Professor Arnold Wall has collected assiduously for a number of years. His publications (Trans. N.Z. Inst.) include an interesting account of the distribution of *Senecio saxifragoides* and *S. lagopus* on Banks Peninsula (Trans. N.Z. Inst., vol. 50).

Other contributions by investigators working in New Zealand include (Trans. N.Z. Inst.) an account of the vegetation of Westport district by Mr. W. Townson, Pteridophytes of Banks Peninsula by Mr. W. Martin, the flora of Mongonui County by Mr. H. Carse, and the grasses of Tutira by Mr. H. Guthrie-Smith.

Lists of plants have been separately published by Mr. W. Martin for the neighbourhood of Dunedin, Professor C. Chilton for Riccarton Bush, Christchurch, and Professor A. Wall for the vicinity of Christchurch.

Foreign workers who have included in their publications New Zealand material are—Dr. G. Beauverd, on Compositae (Bull. Soc. Gen.); Dr. G. Bitter, on *Acaena;* Dr. A. Thellung, on *Lepidium;* and the contributors to "Das Pflanzenreich."

ECOLOGICAL BOTANY.

Foremost among the publications dealing with the ecological aspects of the plants of New Zealand are the writings of Dr. L. Cockayne. Of a general nature is his article entitled "Observations concerning Evolution derived from Ecological Studies in New Zealand" (Trans. N.Z. Inst., vol. 44). Other articles in the Transactions describe the plant formations of Open Bay Islands, Poor Knights Islands, Mount Fyffe, and, in collaboration with Mr. C. E. Foweraker, the vegetation of the Cass Biological Station, and with

Mr. R. M. Laing, that of the Mount Arrowsmith district. The vegetation of the Subantarctic Islands of New Zealand (other than Campbell Island) was described in Volume I of the "Subantarctic Islands of New Zealand," 1909. A series of parliamentary papers issued by the Lands Department covered botanical surveys of Kapiti Island, Tongariro National Park, Stewart Island, Waipoua Kauri Forest, and the sand-dune areas of New Zealand. An account of the coastal vegetation appeared in the "Transactions of the New Zealand Institute," vol. 39. These studies in the ecological botany of New Zealand culminated in the issue of a volume in Engler and Drude's "Die Vegetation der Erde" in 1921. Dr. Cockayne's book, entitled "The Vegetation of New Zealand," formed No. XIV of the series, contained a general account of the vegetation of New Zealand and the outlying islands, together with a summary of the geographical relationships of the flora, and was illustrated with sixty-five plates, in addition to text figures and maps.

Besides publications of a technical nature, Dr. Cockayne has issued in book form popular accounts of the vegetation of New Zealand. His "New Zealand Plants and their Story" has passed through two editions, and a third is now in the Press. In this connection may also be mentioned his recently issued handbook "The Cultivation of New Zealand Plants."

Other writers who have contributed to our knowledge of the plant formations of New Zealand by publishing descriptions of vegetation are Mr. R. M. Laing, on Campbell Island (Subantarct. Is. N.Z.); Mr. E. Phillips Turner, on the Waimarino district (parliamentary paper); and Mr. D. L. Poppelwell, on the Garvie Mountains, Ruggedy Mountains, Codfish Island, and Breaksea Islands (Trans. N.Z. Inst.). My own papers on the Kermadec Islands (Trans. N.Z. Inst.) and White Island (Jour. Linn. Soc. Bot.) may be mentioned here.

A volume by Hon. G. M. Thomson, issued under the title of "A New Zealand Naturalist's Calendar," contains many interesting observations on native plants, while a paper on the role of tree-ferns in the forest has been published by Miss A. Pope (N.Z. Jour. Sci. & Tech., vol. 6).

Professor D. H. Campbell has published a general description of the vegetation of New Zealand from notes collected during a visit in 1922 (Amer. Jour. Bot., vol. 10).

Ecological papers of economic interest include a series by Dr. Cockayne on the montane tussock grasslands of New Zealand, being the results of systematic experiments (N.Z. Jour. Agr.); an article by Mr. A. H. Cockayne on the same subject (Trans. N.Z. Inst., vol. 48); the series of papers on New Zealand grasslands, by Mr. E. Bruce Levy (N.Z. Jour. Agr.); and an account of the flax, *Phormium tenax*, by Mr. E. A. Atkinson (Dept. Agr. Bull. 95).

PLANT ANATOMY.

The period 1905–24 has been marked by the issue of a number of papers describing the minute structure of New Zealand plants. These are all of very great importance from an ecological standpoint, and in not a few cases are of great taxonomic value. Many of the papers are based on theses of University students.

Foremost in the matter of importance, both from an ecological and taxonomic point of view, is the series of papers on New Zealand Pteridophytes, published by Rev. Dr. J. Holloway. The genus *Lycopodium* has

been investigated from many points of view, and the prothallus of *Tmesipterus* has been described. Later contributions from Dr. Holloway deal with the ecology and distribution of the Hymenophyllaceae (Trans. N.Z. Inst.).

The Pteridophytes have also received attention from Mr. G. B. Stephenson, on young stages of *Dicksonia* and *Cyathea* (Trans. N.Z. Inst., vol. 40); and Miss K. V. Edgerley, on the prothallia of *Lycopodium* (Trans. N.Z. Inst., vol. 47).

The Gymnosperms have been investigated by Miss E. M. Griffen, on the development of Conifer leaves (Trans. N.Z. Inst., vol. 40), and Dr. J. S. Yeates, on root-nodules in New Zealand pines (N.Z. Jour. Sci. & Tech., vol. 6).

The following authors have contributed to the "Transactions of the New Zealand Institute" papers in which the anatomy of New Zealand flowering-plants is described: Miss N. A. R. Greensill, leaves of *Coprosma*; Miss A. C. Finlayson, stems of leafless plants; Miss E. M. Herriott, plants of the southern islands; Miss B. D. Cross, Halophytes; Miss A. F. Ironside, New Zealand Piperaceae; Miss F. W. Cooke, *Salicornia australis*; Miss E. S. Pegg, sand-dune plants; Miss L. A. Suckling, trees and shrubs of the Port Hills, Christchurch; Miss E. M. Pigott, *Nothopanax arboreum*; Miss M. W. Betts, plants from the peridotite belt, Nelson, and rosette plants from the Cass district; Mr. J. W. Bird, lianes of Canterbury Plains forest; Mr. C. E. Foweraker, mat and cushion plants of Cass River bed.

Outside New Zealand, Dr. H. Hauri has published descriptions of New Zealand cushion plants (Bot. Centrabl., vol. 33). Mr. R. S. Adamson has described the anatomy of the leaves of several species of *Veronica* (Jour. Linn. Soc., vol. 40); Professor F. O. Bower, in his studies on the phylogeny of the Filices (Ann. Bot., vol. 28) dealt with several New Zealand species; Dr. H. Hauri and D. C. Schoeter have dealt with a number of New Zealand cushion plants; and Dr. K. Goebel has described the juvenile forms of New Zealand plants.

EVOLUTION OF SPECIES AND GEOGRAPHICAL DISTRIBUTION.

Dr. Cockayne's paper previously mentioned, "Observations concerning Evolution derived from Ecological Studies in New Zealand," deals with such topics as variation, mutation, epharmony, hybridization, struggle for existence, and distribution. The discovery of hybrids in the genus *Nothofagus* was recorded in N.Z. Jour. Agr., vol. 23, while the whole question of hybridization in the New Zealand flora has been treated more fully in the "New Phytologist," vol. 22, 1923.

Dr. J. C. Willis, in developing his age and area theory, contributed a series of papers to the "Annals of Botany." Several of these dealt with New Zealand and the outlying islands and are incorporated in his book "Age and Area," published in 1922.

Dr. C. Skottsberg contributed to the "Plant World," vol. 18, 1915, a paper on the relations between the floras of New Zealand and subantarctic America.

Distribution within New Zealand has been dealt with by Dr. Cockayne in several of his works and, as a separate paper, in the Cawthron Lecture for 1919, published by the Cawthron Institute.

INTRODUCED PLANTS.

Hon. G. M. Thomson has summarized what is known on naturalized plants in New Zealand in his work on the "Naturalization of Animals and Plants in New Zealand," published in 1922.

Some interesting information regarding the spread of introduced plants is given in "Tutira" by Mr. H. Guthrie-Smith, while Dr. H. H. Allan has recorded the establishment of *Spartina* grass (N.Z. Jour. Sci. & Tech., vol. 6).

CHEMISTRY OF THE NEW ZEALAND FLORA.

A certain amount of investigation has been carried out in the chemistry of native plants. Mr. B. C. Aston has studied various tans, dyestuffs, oils, alkaloids, and poisonous properties, including the dyes obtained from *Coprosma*, the oil of *Tetrapathaea*, and the alkaloids of the pukatea.

Professor T. H. Easterfield and his collaborators have investigated the genus *Podocarpus;* Mr. Roy Gardner has written a general account and studied the essential oil of *Leptospermum;* Mr. Goudie has described the essential oils of *Libocedrus* and *Dacrydium;* Mr. Perkin, the colouring-matter of the puriri; and Messrs. W. F. Short and C. W. Johnson, the essential oil of *Leptospermum*.

LIST OF THE PUBLISHED WORKS OF Mr. T. F. CHEESEMAN.

I. FLORAS OF NEW ZEALAND.

Manual of the New Zealand Flora. pp. xxxvi + 1199. 1906.
Manual of the New Zealand Flora. pp. xliv + 1163. 1925.
Illustrations of the New Zealand Flora. 2 vols. 250 plates with letterpress. 1914. (Assisted by W. B. Hemsley.)

II. FLORAS OF SMALLER AREAS.

(1.) New Zealand.

On the Flora of the Kermadec Islands; with Notes on the Fauna. *Trans. N.Z. Inst.*, vol. 20, pp. 151–181. 1888.
Notes on the Three Kings Islands. *Trans. N.Z. Inst.*, vol. 20, pp. 141–150. 1888.
Further Notes on the Three Kings Islands. *Trans. N.Z. Inst.*, vol. 23, pp. 408–424. 1891.
On the Flora of the North Cape District. *Trans. N.Z. Inst.*, vol. 29, pp. 333–385. 1897.
On the Botany of the Titirangi District of the Province of Auckland. *Trans. N.Z. Inst.*, vol. 4, pp. 270–284. 1872.
Rangitoto Island and its Vegetation. *Handb. Sci. Visitors*, pp. 6–7, 1914; and *N.Z. Nature Notes*, pp. 20–21, 1922.
Some Features of the Auckland Flora. *Handb. Sci. Visitors*, pp. 8–12, 1914; *N.Z. Nature Notes*, pp. 22–26, 1922; and *N.Z. Jour. Sci. & Tech.*, vol. 5, pp. 166–168, 1922 (The Kauri Forest).
On the Botany of the Pirongia Mountain. *Trans. N.Z. Inst.*, vol. 12, pp. 317–323. 1880.
Contributions to a Flora of the Nelson Provincial District. *Trans. N.Z. Inst.*, vol. 14, pp. 301–329. 1882.
On the Systematic Botany of the Islands to the South of New Zealand. *Subant. Is. N.Z.*, vol. 2, pp. 389–471. 1909.
The Vascular Flora of Macquarie Island. *Rept. Austr. Ant. Exp.*, Ser. 3, vol. 7, pt. 3, 63 pp. 1919.

(2.) Rarotonga.

The Flora of Rarotonga, the Chief Island of the Cook Group. *Trans. Linn. Soc.*, Ser. 2. Bot., vol. 6, pt. 6, pp. 261–313. 1903.

III. PAPERS ON NEW ZEALAND INDIGENOUS PLANTS: DESCRIPTIVE AND GEOGRAPHICAL.

(1.) Systematic.

Notice of the Discovery of *Asplenium japonicum*, a Fern new to the New Zealand Flora. *Trans. N.Z. Inst.*, vol. 22, pp. 448–449. 1890.
Description of a New Species of *Polypodium*. *Trans. N.Z. Inst.*, vol. 10, pp. 356–357. 1878.
Description of a New Species of *Hymenophyllum*. *Trans. N.Z. Inst.*, vol. 8, pp. 330–331. 1876.
The Age and Growth of the Kauri. *Trans. N.Z. Inst.*, vol. 46, pp. 9–19. 1914.
Notice of the Occurrence of the Genus *Kyllinga* in New Zealand. *Trans. N.Z. Inst.*, vol. 11, pp. 434–435. 1879.
A Revision of the New Zealand Species of *Carex*. *Trans. N.Z. Inst.*, vol. 16, pp. 414–442. 1884.
Additional Notes on the Genus *Carex*. *Trans. N.Z. Inst.*, vol. 24, pp. 413–416. 1892.

On the Occurrence of the Genus *Sporadanthus* in New Zealand. *Trans. N.Z. Inst.*, vol. 12, pp. 324–325. 1880.
Notice of the Occurrence of *Juncus tenuis* Willd. in New Zealand. *Trans. N.Z. Inst.*, vol. 11, pp. 433–434. 1879.
Notice of the Discovery of a Species of *Burmanniaceae*, a Family new to the New Zealand Flora. *Trans. N.Z. Inst.*, vol. 41, pp. 140–143. 1909.
On *Pterostylis squamata* in New Zealand. *Trans. N.Z. Inst.*, vol. 7, pp. 352–353. 1875.
Description of a New Species of *Corysanthes*. *Trans. N.Z. Inst.*, vol. 31, pp. 351–352. 1899.
Notice of the Occurrence of *Hydatella*, a Genus new to the New Zealand Flora. *Trans. N.Z. Inst.*, vol. 39, pp. 433–434. 1907.
Notice of the Discovery of the Genus *Rhagodia* in New Zealand. *Trans. N.Z. Inst.*, vol. 16, pp. 408–409. 1884.
Description of a New Species of *Loranthus*. *Trans. N.Z. Inst.*, vol. 13, pp. 296–297. 1881.
On the Occurrence of the Australian Genus *Poranthera* in New Zealand. *Trans. N.Z. Inst.*, vol. 11, pp. 432–433. 1879.
Notice of the Occurrence of *Leucopogon Richei* R. Br. on the Mainland of New Zealand. *Trans. N.Z. Inst.*, vol. 42, pp. 214–215. 1910.
Notes on *Aciphylla;* with Descriptions of New Species. *Trans. N.Z. Inst.*, vol. 47, pp. 39–44. 1915.
Notes on *Pittosporum Dallii*. *Trans. N.Z. Inst.*, vol. 46, pp. 19–20. 1914.
Notes on *Pittosporum obcordatum*. *Trans. N.Z. Inst.*, vol. 39, pp. 435–439. 1907.
On the New Zealand Species of *Coprosma*. *Trans. N.Z. Inst.*, vol. 19, pp. 218–252. 1887.
Description of Three New Species of *Coprosma*. *Trans. N.Z. Inst.*, vol. 18, pp. 315–317. 1886.
Description of a New *Celmisia*. *Trans. N.Z. Inst.*, vol. 46, p. 21. 1914.
Note on *Helichrysum fasciculatum* Buchanan. *Proc. N.Z. Inst.*, 1911, pp. 24–25.
Description of a New Species of *Senecio*. *Trans. N.Z. Inst.*, vol. 7, p. 348. 1875.

(2.) Miscellaneous.

On some Hitherto Unrecorded Plant-stations. *N.Z. Jour. Sci. & Tech.*, vol. 1, pp. 202–205. 1882.
On some Additions to the Flora of New Zealand. *Trans. N.Z. Inst.*, vol. 14, pp. 299–301. 1882.
On some Recent Additions to the Flora of New Zealand. *Trans. N.Z. Inst.*, vol. 15, pp. 298–301. 1883.
Additions to the New Zealand Flora. *Trans. N.Z. Inst.*, vol. 16, pp. 409–413. 1884.
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On some Recent Additions to the New Zealand Flora. *Trans. N.Z. Inst.*, vol. 24, pp. 409–412. 1892.
On some Additions to the New Zealand Flora. *Trans. N.Z. Inst.*, vol. 28, pp. 534–537. 1896.
On some Plants new to the New Zealand Flora. *Trans. N.Z. Inst.*, vol. 29, pp. 390–393. 1897.
Some Recent Additions to the New Zealand Flora. *Trans. N.Z. Inst.*, vol. 33, pp. 312–313. 1901.
Some Recent Additions to the Flora of New Zealand. *Trans. N.Z. Inst.*, vol. 42, pp. 216–218. 1910.
New Species of Plants. *Trans. N.Z. Inst.*, vol. 43, pp. 175–178. 1911.
A New Genus and some New Species of Plants. *Trans. N.Z. Inst.*, vol. 44, pp. 159–162. 1912.
Some New Species of Plants. *Trans. N.Z. Inst.*, vol. 45, pp. 93–96. 1913.
New Species of Flowering-plants. *Trans. N.Z. Inst.*, vol. 47, pp. 45–47. 1915.
New Species of Plants. *Trans. N.Z. Inst.*, vol. 48, pp. 210–215. 1916.
Some Additions to the New Zealand Flora. *Trans. N.Z. Inst.*, vol. 51, pp. 92–95. 1919.
New Species of Flowering-plants. *Trans. N.Z. Inst.*, vol. 53, pp. 423–425. 1921.
New Species of Flowering-plants. *Trans. N.Z. Inst.*, vol. 54, pp. 565–569. 1923.
Contributions to a Fuller Knowledge of the Flora of New Zealand. *Trans. N.Z. Inst.* No. 1, vol. 39, pp. 439–450. 1907. No. 2, vol. 40, pp. 270–285. 1908. No. 3, vol. 41, pp. 200–213. 1909. No. 4, vol. 43, pp. 178–186. 1911. No. 5, vol. 46, pp. 1–9. 1914. No. 6, vol. 51, pp. 85–92. 1919, No. 7, vol. 52, pp. 9–16. 1920.

(3.) Fertilization of New Zealand Plants.

On the Fertilization of *Acianthus* and *Cystostilis*. *Trans. N.Z. Inst.*, vol. 7, pp. 349–352. 1875.
On the Fertilization of the New Zealand Species of *Pterostylis*. *Trans. N.Z. Inst.*, vol. 5, pp. 352–357, pl. 20. 1873.
On the Fertilization of *Thelymitra*. *Trans. N.Z. Inst.*, vol. 13, pp. 291–296. 1881.
Notes on the Fertilization of *Knightia*. *N.Z. Jour. Sci. & Tech.*, vol. 1, pp. 173–175. 1882.
Notes on the Fertilization of *Knightia*. *Rept. A.A.A.S.*, vol. 2, pp. 473–476. 1890.
On the Fertilization of *Selliera*. *Trans. N.Z. Inst.*, vol. 9, pp. 542–545. 1877.
Notes on the Fertilization of *Glossostigma*. *Trans. N.Z. Inst.*, vol. 10, pp. 353–356. 1878.

IV. INTRODUCED PLANTS.

The Naturalized Plants of the Auckland Provincial District. *Trans. N.Z. Inst.*, vol. 15 pp. 268–298. 1883.
Notice of the Establishment of *Vallisneria spiralis* in Lake Takapuna, together with some Remarks on its Life-history. *Trans. N.Z. Inst.*, vol. 29, pp. 386–390. 1897.
On the Occurrence of *Ottelia* in New Zealand. *Trans. N.Z. Inst.*, vol. 31, pp. 350–351. 1899.

V. POLYNESIAN FOOD PLANTS.

Notes on the Cultivated Food Plants of the Polynesians, with Special Reference to the Ti Pore (*Cordyline terminalis*). *Trans. N.Z. Inst.*, vol. 33, pp. 306–311. 1901.

VI. BOTANICAL NOMENCLATURE.

Notes on Botanical Nomenclature; with Remarks on the Rules adopted by the International Botanical Congress of Vienna. *Trans. N.Z. Inst.*, vol. 40, pp. 447–465 1908.

VII. ETHNOLOGY.

Notes on certain Maori Carved Burial-chests in the Auckland Museum. *Trans. N.Z. Inst.*, vol. 39, pp. 451–456. 1907.
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VIII. ZOOLOGY.

(1.) Turbellaria.

On Two New Planarians from Auckland Harbour. *Trans. N.Z. Inst.*, vol. 15, pp. 213–214. 1883.

(2.) Mollusca.

On the Mollusca of the Vicinity of Auckland. *Trans. N.Z. Inst.*, vol. 19, pp. 161–176. 1887.
On the Mollusca of Auckland Harbour. *Trans. N.Z. Inst.*, vol. 8, pp. 304–311. 1876.
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On Two Species of Nudibranchiate Mollusca. *Trans. N.Z. Inst.*, vol. 14, pp. 213–215. 1882.
On a New Species of *Chromodoris*. *Trans. N.Z. Inst.*, vol. 18, p. 137. 1886.
Descriptions of Three New Species of Opisthobranchiate Mollusca, from New Zealand. *Trans. N.Z. Inst.*, vol. 11, pp. 378–380, pl. 16. 1879.
On a New Genus of Opisthobranchiate Mollusca. *Trans. N.Z. Inst.*, vol. 13, p. 224. 1881.

(3.) Fishes.

Notes on the Swordfish (*Ziphias gladius*). *Trans. N.Z. Inst.*, vol. 8, pp. 219–220. 1876.
Notice on the Occurrence of the Basking Shark (*Selache maxima* L.) in New Zealand. *Trans. N.Z. Inst.*, vol. 23, pp. 126–127. 1891.

(4.) Reptiles.

On the Occurrence of the Luth, or Leathery Turtle, on the Coasts of New Zealand. *Trans. N.Z. Inst.*, vol. 25, pp. 108–110. 1893.

Notes on the Occurrence of certain Marine Reptilia in New Zealand Waters. *Trans. N.Z. Inst.*, vol. 40, pp. 267–269. 1908.

(5.) Birds.

On some Birds from the Kermadec Islands. *Trans. N.Z. Inst.*, vol. 21, pp. 121–124. 1889.

On the Birds of the Kermadec Islands. *Trans. N.Z. Inst.*, vol. 23, pp. 216–226. 1891.

Notice of the Capture of a Specimen of the Shy Albatross (*Diomedea cauta*) near Auckland. *Trans. N.Z. Inst.*, vol. 21, pp. 125–126. 1889.

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Notice of the Occurrence of the Eastern Golden Plover (*Charadrius fulvus*) in the Auckland District. *Trans. N.Z. Inst.*, vol. 14, pp. 264–265. 1882.

Notice of the Occurrence of the Australian Snipe (*Gallinago australis*) in New Zealand. *Trans. N.Z. Inst.*, vol. 31, pp. 105–106. 1899.

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(6.) Mammals.

Notes on the New Zealand Bats. *Trans. N.Z. Inst.*, vol. 25, pp. 218–222. 1894.

IX. MISCELLANEOUS.

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MANUAL

OF THE

NEW ZEALAND FLORA.

Family 1. **FILICES.**

PERENNIAL or very rarely annual plants, usually herbaceous but sometimes arboreous (tree-ferns). Stems generally reduced to a rhizome, which may be short and tufted, or long and creeping or climbing; or, in the case of tree-ferns, produced into an erect caudex or trunk. Leaves (*fronds*) either crowded at the end of the rhizome or distantly placed along it, continuous with the rhizome or jointed to it, sometimes simple and entire, but usually more or less deeply pinnately lobed or divided and frequently repeatedly so, more rarely dichotomously branched; always circinate in vernation with the exception of the *Ophioglossaceae*. Spore-cases or *sporangia* usually arranged in groups (*sori*) on the under-surface or margins of the fertile fronds, which are either similar to the sterile fronds, or narrower and more contracted, the divisions sometimes becoming linear and spike-like. Sori very various in size and shape and position, naked or covered when young by the recurved margin of the frond or by a special involucre (*indusium*). Sporangia many or rarely few in a sorus, often mixed with jointed hairs or scales, stalked or sessile, usually furnished with a complete or incomplete ring or *annulus*, dehiscing by a transverse or vertical slit, free or rarely coherent into a compound sporangium (*synangium*). Spores numerous, bilateral or tetrahedral.

Ferns constitute one of the largest and most generally distributed of the families of plants, and are found in all quarters of the world, although most abundant in warm and moist climates. It is difficult to estimate the number of species, on account of the divergent views of authors, but probably from 5000 to 5500 would be a fair estimate. In the first edition of this book I followed the limitation of the genera proposed in Hooker and Baker's "Synopsis Filicum," that being the arrangement adopted in Hooker's "Handbook," Bentham's "Flora Australiensis," and other colonial Floras; and the one then acquiesced in by most English systematists. But now pteridologists as a whole adopt a much larger number of genera, with a somewhat different sequence. And it must be admitted that *Polypodium*, *Nephrodium*, *Asplenium*, and other genera, as defined in the "Synopsis Filicum," are for the most part artificial assemblages of species, possessing very diverse characters and relationships. But although it is comparatively easy to separate a group here and there as being undoubtedly worthy of generic rank; it is admittedly a matter of great difficulty to prepare good and natural generic subdivisions for the whole family. The most satisfactory classification yet propounded is that given by Diels and others in Engler and Prantl's "Die Naturlichen Pflanzenfamilien," where the class Filicales is divided into 12 families and 140 genera, against the 75 genera adopted in the "Synopsis Filicum." After some consideration, I have decided to follow this classification, as restated and slightly amended by Christensen in his "Index Filicum" (1906).

The development of ferns can only be briefly alluded to here. In germination the spore produces a small flattened or rarely filamentous prothallium, usually containing abundant chlorophyll, but without vascular tissue. It becomes quite free from the spore, but is of comparatively short duration. On the under-surface of the prothallium the reproductive organs are formed. The male organs are called antheridia, and consist of minute subglobose bodies each containing numerous motile cells known as spermatozoids, resembling spirally coiled filaments, pointed at one end and bearing numerous cilia. The female organs, or archegonia, are flask-shaped bodies partly sunk in the tissue of the prothallium, each containing a single free cell called the oosphere. Fertilization is effected by the entrance of spermatozoids into the cavity of the archegonium, and by the fusion of one of them with the oosphere. The oosphere then gradually develops into a young plant.

Prior to the publication of the first edition of this work several pamphlets or books dealing with the Ferns of the Colony have appeared. The most important are Mr. G. M. Thomson's "Ferns and Fern Allies of New Zealand" and Mr. H. C. Field's "Ferns of New Zealand." Both of these contain much interesting and valuable matter, and should be consulted by all students of the family. An excellently illustrated book on the Ferns of the Dominion, prepared by Mr. H. Dobbie, has also appeared wh le this acco nt was being written.

Suborder I. HYMENOPHYLLACEAE. *Sori always marginal, enclosed within a cup-shaped or urceolate entire or 2-valved indusium. Sporangia sessile or shortly stalked, arranged on a short or long columnar receptacle, girt by a complete horizontal or oblique ring. Fronds membranous and translucent (except in* Loxsoma*).*

Fronds membranous and translucent. Indusium deeply 2-valved — 1. HYMENOPHYLLUM.
Fronds membranous and translucent. Indusium urceolate or trumpet-shaped, entire or shortly 2-lobed .. .. .. — 2. TRICHOMANES.
Fronds coriaceous, opaque. Indusium urceolate, entire .. — 3. LOXSOMA.

Suborder II. CYATHEACEAE. *Sori dorsal or marginal, naked or furnished with an indusium. Sporangia sessile or shortly stalked, arranged on a cushion-like receptacle, girt by a complete vertical or somewhat oblique ring. Stem often arboreous.*

Indusium 2-valved, the upper valve continuous with the margin of the frond .. .. — 4. DICKSONIA.
Indusium globose, covering the young sorus, but soon bursting at the summit and persistent as a shallow cup surrounding the sorus at the base .. .. — 5. CYATHEA.
Indusium never covering the sorus, small, half cup-shaped or semicircular, one-sided, not forming a complete ring round the base of the sorus .. .. — 6. HEMITELIA.
Indusium altogether wanting .. .. — 7. ALSOPHILA.

Suborder III. POLYPODIACEAE. *Sori dorsal or marginal, naked or furnished with an indusium. Sporangia with a short or long stalk, girt by an incomplete vertical ring, bursting transversely. Habit various.*

* Sori dorsal, remote from the margin of the frond. Indusium hooded or globose or reniform, opening all round its margin.

Indusium hooded, ovate-deltoid, attached by a broad base .. — 8. CYSTOPTERIS.
Indusium orbicular and peltate .. .. — 9. POLYSTICHUM.
Indusium reniform, attached by the sinus. Fronds usually 2–4-pinnate; pinnae not articulate on the rhachis .. .. — 10. DRYOPTERIS.
Indusium wanting. Fronds pinnate; pinnae articulate on the rhachis .. .. — 11. ARTHROPTERIS.
Indusium present, usually reniform. Fronds pinnate, articulated on the rhachis .. .. — 12. NEPHROLEPIS.

** Sori marginal. Indusium opening outwards, or towards the margin of the frond.

Indusium ovate, attached by a broad base, its free margin scalloped .. .. — 13. LEPTOLEPIA.
Indusium cup-shaped, attached by both base and sides .. — 14. DAVALLIA.
Sori linear. Indusium 2-valved; upper valve formed by the altered margin of the frond .. .. — 15. LINDSAYA.

*** Sori linear or oblong, dorsal or submarginal. Indusium the same shape as the sorus; opening inwards (towards the costa).

Sori short, oblong, situated on a veinlet. Indusium inflated, straight or arcuate .. .. — 16. ATHYRIUM.

Sori linear, placed on a vein. Indusium double; one opening towards the midrib, the other away from it .. .. 17. DIPLAZIUM.
Sori linear, attached to a vein. Indusium single, opening towards the midrib .. .. 18. ASPLENIUM.
Sori long, linear, attached to transverse veinlets running parallel to the midrib. Indusium opening towards the midrib .. 19. BLECHNUM.
Sori short, oblong, on transverse veins joining the main veins. Indusium opening towards the midrib .. .. .. 20. DOODIA.

**** Sori marginal. Indusium composed of the more or less modified margin of the frond, which is reflexed over the sori, thus opening inwards.

Sori oblong or linear, simple or forked, often confluent. Indusium wanting .. .. 21. GYMNOGRAMME.
Sori confluent into a linear band along the margin of the pinnae. Indusium continuous .. .. 22. PELLAEA.
Sori oblong, ultimately confluent, often concealed by the reflexed but barely altered margin of the frond .. .. .. 23. NOTHOCHLAENA.
Sori subglobose or oblong, often confluent into linear masses. Indusium composed of the modified and reflexed margin of the frond .. .. 24. CHEILANTHES.
Sori globose, distinct, in the notches of the ultimate divisions of the frond. Indusium a modified and reflexed portion of the margin of the frond .. .. 25. HYPOLEPIS.
Sori reniform or globose or oblong. Indusium an altered and reflexed lobe or tooth of the frond, bearing the sorus on its under-surface .. .. 26. ADIANTUM.
Sori marginal, linear, continuous. Indusium always single. Veins free or anastomosing. Spores tetrahedral .. .. 27. PTERIS.
Sori marginal, linear, continuous. Indusium always single. Veins free or anastomosing. Habit of *Pteridium*. Spores bilateral .. .. 28. HISTIOPTERIS
Sori marginal, linear, continuous. Indusium double, outer the reflexed margin of the frond, inner arising from the receptacle. Spores tetrahedral .. .. 29. PTERIDIUM.
Sori marginal, linear, continuous. Indusium usually double. Fronds more finely cut than in *Pteridium*. Spores bilateral.. 30. PAESIA.

***** Sori dorsal, remote from the margin of the frond. Indusium wanting. Fronds articulated on the rhizome (Eremobryoid).

Fronds simple or compound, glabrous; or indumentum, if present, composed of simple hairs or scales .. .. .. 31. POLYPODIUM.
Fronds simple, sometimes dimorphous, under-surface covered with matted stellate hairs .. .. 32. CYCLOPHORUS.

Suborder IV. GLEICHENIACEAE. *Sori dorsal, naked, of few (2–6) sporangia; receptacle not elevated. Sporangia sessile or nearly so, splitting vertically, surrounded by a complete transverse ring.*

Fronds dichotomously forked; ultimate branches pinnately divided .. .. 33. GLEICHENIA.

Suborder V. SCHIZÆACEAE. *Sporangia crowded, not collected into distinct sori, sessile or nearly so, with a complete transverse ring just below the apex, splitting vertically. Fertile portions of the frond much modified.*

Fronds simple or forked or flabellately divided, without an expanded lamina. Sporangia in 2–4 rows on the under-surface of short linear fertile pinnae terminating the fronds.. .. 34. SCHIZÆA.
Fronds very long, climbing; primary pinnae dichotomously or pinnately divided. Sporangia in 2 rows on the under-surface of contracted fertile pinnules .. .. 35. LYGODIUM.

Suborder VI. OSMUNDACEAE. *Sori irregular, distinct or confluent, dorsal; indusium wanting. Sporangia sessile or nearly so, splitting vertically; ring rudimentary, placed just below the apex.*

Fronds coriaceous, dense and opaque .. .. .. 36. TODEA.
Fronds membranous, thin and translucent .. .. .. 37. LEPTOPTERIS

Suborder VII. MARATTIACEAE. *Sori distinct, dorsal. Sporangia sessile, without any ring, coriaceous, splitting vertically or opening by a pore at the apex, usually cohering in concrete masses called synangia.*

Rhizome large, tuberous. Fronds large, 2–3-pinnate .. .. 38. MARATTIA.

Suborder VIII. OPHIOGLOSSACEAE. *Sporangia globose, coriaceous, sessile, without any ring, dehiscing by a transverse or vertical slit, crowded on a linear spike or on the branches of a panicle. Fronds not circinate in vernation.*

Sterile frond simple and entire. Sporangia on a linear spike .. 39. OPHIOGLOSSUM.
Sterile frond pinnate or 2–4-pinnate. Sporangia on the linear branches of a panicle .. .. 40. BOTRYCHIUM.

1. **HYMENOPHYLLUM** Linn.

Usually small and sometimes minute ferns. Rhizome slender, creeping, often much branched and matted. Fronds simple or more generally compound, delicately membranous, often pellucid, usually of a single layer of cells; segments entire or toothed at the margin, with a stout central costa. Sori marginal, terminal or lateral, more or less immersed in the frond or quite free, always terminating a vein or costa. Indusium cup-shaped, more or less deeply 2-lipped or 2-valved, sometimes to the base, of almost the same texture as the frond, margins of the lips entire or toothed or fringed. Receptacle linear or oblong, not exserted beyond the indusium. Sporangia sessile or nearly so, depressed, surrounded by a broad complete horizontal ring, bursting transversely.

One of the most beautiful of the genera of ferns, almost wholly confined to shaded localities, and remarkable for the filmy texture of the frond, a peculiarity which it shares with *Trichomanes* and *Leptopteris*. Species about 150, widely distributed in tropical climates and in the South Temperate Zone, especially abundant in New Zealand, rare in the North Temperate Zone. Of the 20 species found in New Zealand, 7 or perhaps 8 are endemic, the remainder are for the most part widely dispersed.

A. Euhymenophyllum. *Margin of the frond entire.*

* Fronds glabrous; or, if hairs are present, they are confined to the stipes, rhachis, and costae.

† Rhachis winged throughout; wing often decurrent down the stipes, sometimes to the base.

Fronds 1–4 in., pendulous, flaccid, 2-pinnatifid. Stipes capillary; rhachis often wingless below. Sori large, terminal, immersed; indusium orbicular .. .. 1. *H. rarum.*
Fronds 2–9 in., olive-green, 3-pinnatifid, sometimes with scattered hairs on the rhachis and stipes. Sori terminating short lateral segments, free; indusium broadly ovate .. 2. *H. sanguinolentum.*
Fronds 2–6 in., brownish-green, 3–4-pinnatifid; segments narrow, crowded. Stipes, rhachis, and costae usually villous. Sori numerous, terminal, free; indusium broadly ovate .. 3. *H. villosum.*
Fronds 3–9 in., triangular. Rhachis with a broad much-crisped wing decurrent almost to the base of the stipes. Sori terminal, free; indusium orbicular .. .. .. 4. *H. australe.*
Fronds 2–3 in., linear-oblong, dull dark-green. Rhachis with a broad flat wing decurrent almost to the base of the stipes. Sori terminal, free; indusium ovate, margins often jagged .. 5. *H. atrovirens.*
Rhizome short, bristly. Fronds 9–20 in., ovate-lanceolate, pale-green. Rhachis with a narrow flat wing decurrent down the stipes. Sori terminal, free; indusium orbicular .. .. 6. *H. pulcherrimum.*
Rhizome long, glabrous. Fronds 9–20 in., ovate-lanceolate; segments broad, flat. Rhachis with a narrow flat wing decurrent along the stipes. Sori terminal, immersed; indusium orbicular .. .. 7. *H. dilatatum.*

†† Rhachis winged only towards the top; lower part and stipes naked (often narrowly winged in *H. demissum*).

Fronds 4–12 in., ovate-deltoid, bright-green; stipes and rhachis glabrous. Sori terminal, free; indusium ovate .. .. 8. *H. demissum.*
Fronds 6–20 in., ovate-lanceolate, brownish-green; stipes and rhachis bristly. Sori terminal; indusium orbicular .. 9. *H. scabrum.*
Fronds 3–9 in., pale glistening-green; lower pinnae often flabellate. Stipes woolly at the base. Sori terminal, small; indusium broadly ovate or orbicular .. .. .. 10. *H. flabellatum.*
Fronds ½–1½ in., deltoid, very delicate. Stipes, rhachis, and costae with silky flexuous hairs. Sori terminal, small, partly immersed; indusium ovate-orbicular .. .. .. 11. *H. rufescens.*

** Fronds with the margins and both surfaces densely clothed with stellate hairs.

Fronds 2–6 in., oblong; rhachis broadly winged throughout, the wing decurrent along the upper part of the stipes. Sori terminal, immersed .. .. 12. *H. ciliatum.*
Fronds 2–10 in., oblong-lanceolate; rhachis winged only towards the top; stipes naked. Sori terminal, immersed .. 13. *H. ferrugineum.*
Fronds 2–8 in., linear-oblong, rigid and coriaceous, everywhere hidden by dense tomentum; rhachis not winged. Sori terminal, free .. .. 14. *H. Malingii.*

B. Leptocionium. *Margins of the frond spinulose-dentate.*

Fronds minute, ¼–1 in., simple or forked or digitately divided. Indusium with entire valves .. .. 15. *H. Cheesemanii.*
Fronds minute, ¼–1 in., pinnatifid. Sori solitary, free, terminating the main rhachis; indusium with the valves spinulose on the back and margins .. .. 16. *H. minimum.*
Fronds 1–4 in., pinnate; pinnae divided. Sori lateral, near the base of the pinnae, free; indusium with the valves smooth on the back, spinulose-dentate on the margins .. .. 17. *H. Tunbridgense.*
Fronds 1–4 in., pinnate; pinnae divided. Sori lateral, near the base of the pinnae, free; indusium with the valves smooth on the back; margins entire .. .. 18. *H. peltatum.*
Fronds 4–8 in., 3–4-pinnatifid. Sori lateral, near the base of the pinnae, free; indusium large, often decurved, obovoid; valves with entire margins .. .. 19. *H. multifidum.*
Fronds 6–12 in., 3–4-pinnatifid. Sori terminal, immersed in the tips of the segments; indusium ovate-orbicular, valves with entire margins .. .. 20. *H. bivalve.*

1. **H. rarum** *R. Br. Prodr.* (1810) 159.—A very delicate pale glistening-green pellucid species, forming matted patches on the trunks of trees or on rocks. Rhizomes creeping, much branched, very slender, wiry, black. Fronds very variable in size and shape, usually from 1–4 in. long, but sometimes dwarfed to ½ in., and occasionally lengthened out to 6 or 8 in., broadly oblong to linear-oblong, 2-pinnatifid, in large specimens pinnate at the base, pendulous, membranous, flaccid, quite glabrous. Stipes extremely slender, capillary, often half the length of the whole frond; main rhachis usually winged throughout. Pinnae close, often overlapping, once or twice forked or pinnatifid, rarely simple. Segments erecto-patent, ¼–½ in. long, $\frac{1}{10}$ in. broad, flat, obtuse, quite entire. Sori mostly near the summit of the frond, sunk in the tips of the segments. Indusium large, almost as broad as the segments, broadly rhomboid, divided half-way down, cuneate at the base: valves broad, rounded.—*Hook. Sp. Fil.* i (1846) 101; *Hook. f. Fl. Antarct.* i (1844) 105; *Fl. Nov. Zel.* ii (1855) 12; *Handb. N.Z. Fl.* (1864) 353; *Hook. and Bak. Syn. Fil.* (1873) 58; *Benth. Fl. Austral.* vii (1878) 705; *Thoms. N.Z. Ferns* (1882) 38; *Cheesem. Man. N.Z. Fl.* (1906) 930. H. semibivalve *Hook. and Grev. Ic. Fil.* (1829) t. 83; *A. Rich. Fl. Nouv. Zel.* (1832) 94; *A. Cunn. Precur.* (1836) n. 241;

Raoul Choix (1846) 39. H. imbricatum *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 187.

North and South Islands, Stewart Island, Chatham Islands, Auckland Islands: From Mangonui and Kaitaia southwards, not uncommon in forests. Sea-level to 3000 ft.

Taken in a broad sense, this is a widely distributed plant, found in Australia and Tasmania, Polynesia, Japan, South Africa and Mauritius, and extratropical South America. It is easily recognized by the extremely slender capillary stipes, pendulous pale glaucous-green fronds, broad flat entire segments, and large orbicular sori. When growing in exposed places it is often much dwarfed, with closely imbricating pinnae, constituting Colenso's *H. imbricatum*.

2. **H. sanguinolentum** *Swartz Syn. Fil.* (1806) 149.—Forming matted patches on the trunks or branches of trees or on rotten logs. Rhizome rather stout, creeping, much branched, usually bristly with reddish-brown hairs. Fronds erect or decurved, somewhat opaque, dull olive-green, reddish-brown when dry, 2-9 in. high, broadly ovate or oblong, 3-pinnatifid, glabrous or the stipes and rhachis with scattered red-brown hairs when young. Stipes rather stout, narrowly winged above; rhachis broadly winged throughout, stout, flexuose. Primary pinnae close or rather distant, spreading, rarely decurved; secondary short, deeply pinnatifid. Segments narrow-linear, obtuse, flat or the margins undulate. Sori mainly in the upper part of the frond, usually terminating short somewhat contracted lateral segments, quite free or very slightly sunk at the base. Indusium broader than the segment, broadly ovate or suborbicular, 2-valved to the base; valves obtuse, entire or slightly sinuate, often crested on the back.—H. polyanthos *Swartz Syn. Fil.* (1806) 149, *var.* sanguinolentum; *Hook. f. Fl. Nov. Zel.* ii (1855) 14; *Handb. N.Z. Fl.* (1864) 354; *Hook. and Bak. Syn. Fil.* 60; *Thoms. N.Z. Ferns*, 38; *Field N.Z. Ferns*, 58, t. 28, f. 7; *Cheesem. Man. N.Z. Fl.* (1906) 931. H. sanguinolentum *Swartz Syn. Fil.* (1806) 148, 376; *A. Rich. Fl. Nouv. Zel.* (1832) 93; *A. Cunn. Precur.* (1836) n. 234; *Raoul Choix* (1846) 38. H. lophocarpum *Col. in Trans. N.Z. Inst.* xvii (1885) 255. Trichomanes sanguinolentum *Forst. f. Prodr.* (1786) n. 465.

North and South Islands, Stewart Island, Auckland Islands: Abundant in forests throughout. Sea-level to 3000 ft.

One of the most abundant species of the genus in New Zealand. It stains paper brown when drying, and gives off a peculiar odour, which it often retains for years. The species, or allied forms, are found in almost all tropical countries, but apparently not in Australia.

3. **H. villosum** *Col. in Tasm. Journ. Nat. Sci.* ii (1844) 185.—Forming dense matted patches on the trunks of trees or amongst moss. Rhizome much branched, wiry, creeping. Fronds erect or decurved, opaque, dull brownish-green, 2–6 in. long, 1–2½ in. broad, broadly ovate to ovate-lanceolate, acuminate, 3–4-pinnatifid. Stipes 1–3 in. long, usually narrowly winged above, villous with scattered spreading hairs; rhachis narrowly winged throughout, rather slender, flexuous, more or less villous, as are the partial rhachides and costae. Primary pinnae closely placed, often overlapping, lanceolate-deltoid; secondary rhombic-ovate, again once or twice pinnatifid. Ultimate segments crowded, very narrow, linear, obtuse, flat. Sori numerous, terminating the segments, free. Indusium broadly ovate, obtuse or subacute, broader than the segments, 2-valved to the base; valves

smooth, entire.—*T. Kirk in Trans. N.Z. Inst.* x (1878) 395; *Bak. in Annals Bot.* v (1890–91) 192; *Thoms. N.Z. Ferns* (1882) 39; *Cheesem. Man. N.Z. Fl.* (1906) 931.

North Island: Auckland—Summit of Moehau (Cape Colville), *Adams!* Te Aroha Mountain, *T. F. C.;* Tarawera Mountain, *T. Kirk;* Ruatahuna, *Colenso!* Hawke's Bay—Tukituki River, *A. Hamilton!* Ruahine Mountains, *H. Hill!* Wellington—Tararua Range, *H. H. Travers!* South Island: Not uncommon in subalpine forests throughout, especially in Westland. Stewart Island: Mount Anglem, *T. Kirk.* Auckland Islands: *T. Kirk.* Usually from 2000–4500 ft., but descends almost to sea-level in Westland.

This was placed with *H. sanguinolentum* by Hooker, and is doubtless closely allied to it. But it differs markedly in the much more finely cut 4-pinnatifid fronds, in the villous stipes, rhachis, &c., in the much narrower segments, and in the smaller sori.

4. **H. australe** (*Willd. Sp. Plant.* v (1810) 527.—Forming matted patches on rocks or among moss, more rarely on the trunks of trees, pale-green when young, becoming lurid-green in age. Rhizome creeping, branched, wiry. Fronds erect or decurved, very membranous, 3–9 in. long, 1½–4 in. broad, triangular with usually a broad base, acuminate, quite glabrous, 2–3-pinnatifid. Rhachis with a broad much-crisped wing which extends almost to the base of the stipes. Primary pinnae ¾–2 in. long, rhomboidal-lanceolate, spreading, often decurved at the tips, deeply pinnatifid; secondary again pinnatifid or irregularly forked. Ultimate segments narrow-linear, obtuse, quite entire, more or less crisped, rarely flat. Sori usually numerous, terminal on the segments, free. Indusium orbicular or broadly ovate, usually broader than the segments, 2-valved to the base; valves broad, rounded, entire or slightly erose.—*Bak. in Annals Bot.* v (1890–91) 193; *Cheesem. Man. N.Z. Fl.* (1906) 932. H. javanicum *Spreng. Syst.* iv (1827) 132; *Hook. and Bak. Syn. Fil.* (1873) 60; *Thoms. N.Z. Ferns* (1882) 39; *Field N.Z. Ferns* (1890) 61, t. 15, f. 4. H. crispatum *Wall. Cat.* (1828) 169; *Hook. Sp. Fil.* i (1846) 105; *Hook. f. Fl. Nov. Zel.* ii (1855) 13; *Handb. N.Z. Fl.* (1864) 354. H. flexuosum *A. Cunn. Precur* (1836) n. 238; *Raoul Choix* (1846) 39.

North and South Islands, Stewart Island: Not uncommon in damp woods. Sea-level to 2000 ft.

A common plant in Tasmania, and from thence extending northwards to Malaya, India, and Ceylon. It is easily distinguished from the other New Zealand species by the broad conspicuously crisped wing of the rhachis and stipes.

5. **H. atrovirens** *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 186.—Usually terrestrial. Rhizome slender, wiry, creeping. Fronds few, somewhat rigidly erect, membranous, dull dark-green, 2–6 in. high, ½–1 in. broad, linear-oblong or lanceolate, quite glabrous, 2-pinnatifid. Stipes about half the length of the frond, winged almost to the base; rhachis flexuose, winged throughout, wings flat, not crisped. Pinnae 5–10 on each side, alternate, the lowest usually the largest, ⅓–⅔ in. long, erecto-patent, irregularly pinnatifid. Segments simple or forked, linear, obtuse, flat, quite entire. Sori few, terminating the segments, quite free. Indusium small, ovate, 2-valved almost to the base, slightly broader than the segments; valves obtuse or subacute, entire or jagged.—*Cheesem. Ill. N.Z. Fl.* ii (1914) t. 235. H. javanicum *var.* atrovirens *Hook. and Bak. Syn. Fil.* (1873) 60. H. montanum *T. Kirk in Trans. N.Z. Inst.* x (1878) 394; *Thoms. N.Z. Ferns* (1882) 40; *Field N.Z. Ferns* (1890) 61, t. 28, f. 1.

North Island: Auckland—Bay of Islands, *Miss Clarke!* Whangarei, *T. F. C.*; ravines at Mamaku, near Rotorua, *J. Stewart!* Lake Waikaremoana, *Colenso!* South Island: Nelson—Blind Bay, *Kingsley*. Otago—Mountains at the head of Lake Wakatipu, *Mrs. Mason!* Sea-level to 2500 ft.

I have ventured to restore Mr. Colenso's *H. atrovirens* to the rank of a species, for although undoubtedly very close to *A. australe* it appears to differ sufficiently in the much smaller and narrower more sparingly divided frond, in the flat (not crisped) wings to the rhachis and stipes, and in the narrower segments and smaller ovate indusia. Mr. Kirk's *H. montanum* is clearly the same plant, with the indusia conspicuously jagged. Whether the Australian plant included under *atrovirens* by Baker is also identical I am unable to say, not having seen specimens.

6. **H. pulcherrimum** *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 185.—Forming dense tufts on the branches and trunks of trees. Rhizome short, stout, densely clothed with shining red-brown bristly scales; rootlets woolly. Fronds very handsome, pale-green, erect or pendulous, 9–30 in. long including the stipes, 2–6 in. broad, ovate-lanceolate or linear-oblong, acuminate, membranous, flaccid, quite glabrous, 3–4-pinnatifid. Stipes 2–6 in. long, winged to the base; rhachis also with a narrow wing throughout its length, wings not crisped. Primary pinnae 1½–3 in. long, rhomboidal-lanceolate, 2-pinnatifid down to a narrowly winged flexuous rhachis. Ultimate segments simple or forked, linear, flat, obtuse or retuse, quite entire. Sori terminating short lateral segments, sometimes apparently axillary, quite free. Indusium orbicular, 2-valved to the base; valves convex, quite entire.—*Hook. Sp. Fil.* i (1846) 103, t. 37A; *Hook. f. Fl. Nov. Zel.* ii (1855) 13, t. 74; *Handb. N.Z. Fl.* (1864) 354; *Hook. and Bak. Syn. Fil.* (1873) 62; *Thoms. N.Z. Ferns* (1882) 41; *Field N.Z. Ferns* (1890) 60, t. 20, f. 6; *Cheesem. Man. N.Z. Fl.* (1906) 933.

North Island: Mountainous forests of the interior, from Te Aroha and Lake Waikaremoana southwards. South Island: Rare and local in Nelson, Marlborough, and Canterbury; abundant in Westland and Otago. Stewart Island: Paterson's Inlet, *T. Kirk!* Sea-level to 3000 ft.

A very distinct species, confined to New Zealand.

7. **H. dilatatum** *Swartz Syn. Fil.* (1806) 149.—Large, very handsome, bright-green, clothing the trunks of trees or rotten logs. Rhizome long, stout, wiry, glabrous. Fronds variable in size, usually 9–18 in. long including the stipes, but luxuriant specimens often reach 2 ft. or more, the smaller specimens erect or decurved, the larger usually pendulous, 3–6 in. broad, ovate or ovate-lanceolate to linear-oblong, membranous, 3-pinnatifid. Stipes 2–6 in. long, terete, wiry, narrowly winged almost to the base; rhachis winged throughout, the wing flat, not crisped. Primary pinnae 1½–3 in. long, ovate-lanceolate, cuneate at the base; secondary broad, almost subpalmate below, irregularly pinnatifid. Ultimate segments linear, often elongated and decurved, about $\frac{1}{10}$ in. broad, obtuse, flat, quite entire. Sori numerous, terminating the segments, sunk in the frond at the base. Indusium orbicular, cuneate at the base, 2-valved more than half-way down; valves convex, rounded at the tip, entire; clusters of sporangia often exserted.—*Hook. and Grev. Ic. Fil.* (1829) t. 60; *A. Cunn. Precur.* (1836) n. 233; *Raoul Choix* (1846) 38; *Hook. Sp. Fil.* i (1846) 104; *Hook. f. Fl. Nov. Zel.* ii (1855) 13; *Handb. N.Z. Fl.* (1864) 354; *Hook. and Bak. Syn. Fil.* (1873) 62; *Thoms. N.Z. Ferns* (1882) 40; *Field N.Z. Ferns* (1890) 59, t. 16, f. 1; *Cheesem. Man. N.Z. Fl.* (1906) 934. Trichomanes dilatatum *Forst. f. Prodr.* (1786) n. 467.

North and South Islands, Stewart Island, Chatham Islands: Abundant in damp woods throughout. Auckland Islands: *Sir J. D. Hooker* (Handbook). Sea-level to 3000 ft.

Also in several of the Polynesian islands and in Java. One of the most handsome species of the genus.

8. **H. demissum** *Swartz Syn. Fil.* (1806) 147.—Terrestrial or epiphytic, forming large patches. Rhizome long, wiry, creeping. Fronds erect or decurved, membranous, bright pale-green, 4–16 in. long including the stipes, 2–5 in. broad, ovate-deltoid or ovate-lanceolate, acuminate, 3–4-pinnatifid. Stipes 2–6 in. long, terete, smooth and glabrous, wiry, not winged above or very obscurely so; rhachis obviously winged in the upper part, but the wing much narrowed and sometimes obsolete below. Primary pinnae spreading or ascending, rhombic-lanceolate or rhombic-triangular; secondary short, broad, again 1–2-pinnatifid. Ultimate segments $\frac{1}{10}$–$\frac{1}{5}$ in. long, $\frac{1}{20}$ in. broad, linear, obtuse, flat, quite entire. Sori small, very numerous at the tips of the segments, not confined to the lateral ones, not sunk in the frond. Indusium ovate, obtuse or subacute, 2-valved to the base; valves entire or lobed.—*A. Rich. Fl. Nouv. Zel.* (1832) 92; *A. Cunn. Precur.* (1836) n. 245; *Raoul Choix* (1846) 39; *Hook. Sp. Fil.* i (1846) 109; *Hook. f. Fl. Nov. Zel.* ii (1855) 14; *Handb. N.Z. Fl.* (1864) 354; *Hook. and Bak. Syn. Fil.* (1873) 61; *Thoms. N.Z. Ferns* (1882) 41; *Field N.Z. Ferns* (1890) 58, t. 18, f. 1; *Cheesem. Man. N.Z. Fl.* (1906) 934. H. erecto-alatum *Col. in Trans. N.Z. Inst.* xi (1879) 431. H. megalocarpum *Col. in Trans. N.Z. Inst.* xv (1883) 318. H. polychilum *Col. in Trans. N.Z. Inst.* xxiv (1892) 395. Trichomanes demissum *Forst. f. Prodr.* (1786) n. 468.

Kermadec Islands, North and South Islands, Chatham Islands, Stewart Island, Auckland Islands: Abundant in woods throughout. Sea-level to 3000 ft.

Also found in Polynesia, Java, and the Philippine Islands. The veinlets often fork towards the tips of the segments, and in profusely fruited specimens there is usually a sorus at the tip of each veinlet. When the fork of the veinlet is very close to the tip of the segment the two sori are often included in a single indusium, the valves of which, however, are more or less cleft at the apex. All gradations can be traced between two indusia placed side by side, and a single indusium containing 2 receptacles. Mr. Colenso's *H. megalocarpum* and *H. polychilum*, named specimens of which appear to me to be identical, are founded mainly on this peculiarity, and show no other differences. His *H. erecto-alatum* was separated on account of the broader crisped wing of the rhachis, but the type specimens prove this character to be a very obscure and uncertain one.

9. **H. scabrum** *A. Rich. Fl. Nouv. Zel.* (1832) 90, t. 14, f. 1.—Usually clothing the trunks of trees, rarely terrestrial. Rhizome long, creeping, wiry, more or less bristly with reddish-brown scales. Fronds very variable in size, usually from 6 in. to 20 in. long, but luxuriant specimens sometimes attain 30 in., 2–5 in. broad, ovate-deltoid or ovate-lanceolate or linear-oblong, acuminate, membranous, dark olive-green or olive-brown, erect or pendulous, 3–4-pinnatifid. Stipes 2–6 in. long, not winged, more or less densely clothed (as are the primary and secondary rhachides and costae) with reddish-brown jointed hairs; rhachis winged above, wingless below. Primary pinnae 1–3 in. long, close or rather distant, spreading or erecto-patent, rhomboidal-lanceolate or -oblong, acuminate; secondary deeply pinnatifid or 2-pinnatifid. Ultimate segments linear, obtuse, flat, quite entire. Sori numerous, terminal on the lateral segments on both sides of the pinna. Indusium rather small, orbicular or ovate-orbicular, 2-valved to the base; valves usually toothed.—*A. Cunn. Precur.* (1836) n. 235; *Raoul Choix* (1846) 39; *Hook. Sp. Fil.* i (1846) 110; *Hook. f. Fl.*

Nov. Zel. ii (1855) 15; *Handb. N.Z. Fl.* (1864) 355; *Hook. and Bak. Syn. Fil.* (1873) 61; *Thoms. N.Z. Ferns* (1882) 42; *Field N.Z. Ferns* (1890) 62, t. 17, f. 4; *Cheesem. Man. N.Z. Fl.* (1906) 935. Sphaerocionum glanduliferum *Presl Epim.* (1849) 23, t. 12.

North and South Islands, Chatham Islands: Moist forests from Hokianga southwards, not uncommon. Sea-level to 3000 ft.

A distinct and beautiful species, easily recognized by the reddish hairs on the stipes, rhachis, and costae, and by the dark colour of the frond. It is confined to New Zealand.

10. **H. flabellatum** *Lab. Pl. Nov. Holl.* ii (1806) 101, t. 250.—Densely matted, usually clothing the trunks of trees. Rhizomes long, wiry, creeping, often much branched and interlaced, more or less clothed with yellow-brown woolly hairs. Fronds very variable in size and shape, usually 3–9 in. long, but sometimes reduced to less than 1 in., at other times attaining a length of 12 in., the smaller specimens generally ovate and erect, the longer ovate-lanceolate to lanceolate or linear-oblong and pendulous, pale shining-green or yellow-green, membranous, glabrous or sparingly silky along the rhachis and sometimes on the margins, 2–3-pinnatifid. Stipes slender, terete, wingless, glabrous except a tuft of silky hairs at the base; main rhachis winged towards the top, wingless elsewhere. Primary pinnae often close and overlapping, short, rhomboidal-ovate or flabellate, acuminate; secondary cuneate at the base, deeply pinnatifid. Ultimate segments linear, flat, entire. Sori small, terminal on the segments, usually on the lateral ones, slightly immersed at the base. Indusium orbicular or nearly so, 2-valved to below the middle; valves usually entire.—*Hook. Sp. Fil.* i (1846) 111; *Hook. f. Fl. Nov. Zel.* ii (1855) 15; *Handb. N.Z. Fl.* (1864) 355; *Hook. and Bak. Syn. Fil.* (1873) 61; *Benth. Fl. Austral.* vii (1878) 705; *Thoms. N.Z. Ferns* (1882) 42; *Field N.Z. Ferns* (1890) t. 19, f. 6; *Cheesem. Man. N.Z. Fl.* (1906) 935. H. nitens *R. Br. Prodr.* (1810) 159; *A. Rich. Fl. Nouv. Zel.* (1832) 94; *A. Cunn. Precur.* (1836) 236; *Raoul Choix* (1846) 39.

North and South Islands, Stewart Island, Chatham Islands, Auckland Islands: Not uncommon in woods throughout. Sea-level to 2500 ft.

Also in Tasmania and south-eastern Australia, and reported from Sumatra and the Philippine Islands. Some varieties approach very closely to narrow-fronded forms of *H. demissum*, but in its ordinary state it cannot be easily confounded with any other.

11. **H. rufescens** *T. Kirk in Trans. N.Z. Inst.* xi (1879) 457, t. 19A.—Very delicate, forming mats on the trunks of trees or on the perpendicular faces of shaded rocks. Rhizome very slender, almost filiform, branched, creeping, sparingly clothed with soft spreading hairs. Stipes much longer than the frond proper, 1–2 in., capillary, wingless, clothed when young with long flexuous hairs. Fronds $\frac{1}{2}$–$1\frac{1}{2}$ in. long, $\frac{1}{2}$–$\frac{3}{4}$ in. broad at the base, deltoid, delicately membranous and pellucid, 2-pinnatifid; rhachis winged almost to the base, and with the veins and occasionally the surfaces of the frond more or less covered with long flexuous silky hairs. Pinnae 3–4 pairs, close, overlapping, cuneate-rhomboid or the lowest almost flabellate, deeply pinnatifid or lobed. Segments linear, obtuse, flat, quite entire. Sori terminating the segments, slightly immersed at the base. Indusium ovate-orbicular, 2-valved to the base; valves entire or slightly toothed, often ciliate.—*Bak. in Annals of Bot.* v (1890–91) 192; *Thoms. N.Z. Ferns* (1882) 43; *Field N.Z. Ferns* (1890) 63, t. 15, f. 6; *Cheesem. Man. N.Z. Fl.* (1906) 936.

North Island: Summit of Te Aroha Mountain, *Adams! T. F. C.*; Oroua River (Ruahine Range), *H. C. Field!* Mount Egmont Ranges, *T. F. C.* South Island: Nelson—Mount Arthur Plateau, *T. F. C.*; Takaka Valley, *Kingsley*; Mount Rochfort, *Rev. F. J. Spencer!* Westland—Okarito, *A. Hamilton!* Southland—Lake Hauroko, *Crosby Smith.* Stewart Island: Rakiahua, *A. Hamilton, P. Goyen, Dr. Cockayne.* 1000–3500 ft.

Nearest to *H. flabellatum*, some mountain forms of which approach it very closely, but separated by the much longer capillary stipes, shorter, broader, and more delicate fronds, and by the copious hairs. *H. ferrugineum* differs in the larger size, the shape of the frond, and in the stellate tomentum.

12. **H. ciliatum** *Swartz Syn. Fil.* (1806) 147.—Usually epiphytical. Rhizome slender, creeping, 1–2 in. long. Fronds 2–6 in. long, 1–2 in. broad, ovate-oblong, acuminate, thin and membranous, 2-3-pinnatifid, more or less clothed with stalked branched or stellate hairs, which are most abundant on the margins. Stipes 1–2 in. long, winged above and ciliated; rhachis broadly winged throughout and also conspicuously ciliated with stellate hairs. Primary pinnae oblong or rhomboidal, cut down to a broad central portion into numerous secondary divisions, which are simple or forked or irregularly pinnatifid. Ultimate segments linear, flat, obtuse, quite entire. Sori numerous, terminating the segments, more or less immersed. Indusium suborbicular, 2-valved half-way down; valves ciliated.—*Hook. f. Handb. N.Z. Fl.* (1864) 747; *Hook. and Bak. Syn. Fil.* (1873) 63; *Thoms. N.Z. Ferns* (1882) 43; *Field N.Z. Ferns* (1890) 64; *Cheesem. Man. N.Z. Fl.* (1906) 937.

South Island: Nelson—*Travers* (Handbook).

An abundant plant throughout the whole of tropical America, from Cuba and Mexico to Chile; also in tropical Africa, Madagascar, and Mauritius. I have seen no New Zealand specimens, the plant not having been refound since its original discovery by Mr. Travers nearly forty years ago.

13. **H. ferrugineum** *Colla in Mem. Act. Torino*, 39 (1836) 30.—Forming dense mats on the stems of fern-trees and on tree-trunks, or on the perpendicular faces of shaded rocks. Rhizome long, slender, filiform, tomentose with reddish-brown hairs. Fronds 2–10 in. long, $\frac{3}{4}$–2 in. broad, ovate-lanceolate or lanceolate, acute or acuminate, very thin and membranous, yellow-brown or tawny, usually pendulous, 2–3-pinnatifid, everywhere clothed with copious silky stellate hairs. Stipes filiform, not winged; rhachis narrowly winged above, wingless below. Primary pinnae short, erecto-patent, ovate-lanceolate, cuneate at the base; secondary irregularly pinnatifid or forked. Ultimate segments close, linear, obtuse, flat, quite entire. Sori numerous, small, terminal, sunk in the tips of the lateral segments. Indusium orbicular or broader than long, 2-valved almost to the base; valves rounded, copiously ciliated with stellate hairs.—H. subtilissimum *Kunze Anal. Pteridog.* (1837) 49; *Hook. and Bak. Syn. Fil.* (1873) 64; *Field N.Z. Ferns* (1890) 63, t. 15, f. 2; *Cheesem. Man. N.Z. Fl.* (1906) 937. H. aeruginosum *Hook. Sp. Fil.* i (1846) 94, *non Carm.*; *Hook. f. Fl. Nov. Zel.* ii (1855) 15; *Handb. N.Z. Fl.* (1864) 355. H. Franklinanum *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 183.

North and South Islands, Stewart Island: Damp forests from Kaitaia southwards, not uncommon, except on the east coast of the South Island, where it is rare and local. Sea-level to 2500 ft.

Also on the Island of Juan Fernandez and in Chile, and closely allied to the Tristan d'Acunha *H. aeruginosum* Carm., with which it was united by Sir J. D. Hooker.

14. **H. Malingii** *Metten. Abh. Sachs. Ges. Wiss.* 7 (1864) 489.—Forming small patches on the trunks and branches of trees. Rhizome slender, creeping, sparsely clothed with reddish-brown hairs. Fronds 2–8 in. long, ½–1½ in. broad, narrow-oblong to linear, erect or pendulous, opaque, rigid, reddish-brown or greyish-brown, everywhere most densely covered with stellate hairs mixed with very minute close-set clavate papillae, 2–3-pinnatifid. Stipes 1–3 in. long, very slender, almost filiform, not winged, densely tomentose. Pinnae close or distant, ⅓–⅔ in. long, rarely more, the lower ones ovate-rhomboidal, the upper oblong, deeply pinnatifid; secondary divisions cuneate or flabellate, deeply pinnatifidly cut. Ultimate segments very narrow-linear, obtuse, almost terete and coriaceous from the dense coating of tomentum, which entirely conceals the frond proper. Sori small, terminating the segments. Indusium hidden by the tomentum, orbicular, 2-valved rather more than half-way down; valves denticulate at the apex.—*Hook. and Bak. Syn. Fil.* (1873) 66; *Thoms. N.Z. Ferns* (1882) 44; *Field N.Z. Ferns* (1890) 67, t. 7, f. 2; *Cheesem. Man. N.Z. Fl.* (1906) 938; *Ill. N.Z. Fl.* ii (1914) t. 235. Trichomanes Malingii *Hook. Garden Ferns* (1862) t. 64; *Hook. f. Handb. N.Z. Fl.* (1864) 357.

North Island: Summit of Te Aroha Mountain, *Adams! T. F. C.;* Mount Egmont, *Mrs. Jones, T. F. C.;* Waimarino Plains, *T. F. C., E. Phillips Turner!* Ruahine Mountains and base of Ruapehu, *H. C. Field.* South Island: Nelson—Mountains behind Massacre Bay, *Maling;* Takaka, *Kingsley;* Motueka, *Cockayne.* Westland—Mountains near Greymouth, *Enys!* near Kumara, *J. M. Brame!* Franz Josef Glacier, *Cockayne, Haast.* Canterbury—Banks Peninsula, *T. H. Potts!* Otago—Mount Cargill, Pine Hill, *Buchanan! Thomson!* 500–3500 ft.

A most curious and remarkable little plant, confined to New Zealand. The peculiar indumentum of the frond is well worth careful examination. It is usually found on trunks of *Libocedrus Bidwillii;* but Mr. Phillips Turner has noticed it on *Dacrydium intermedium,* and I have seen it on *Nothofagus Menziesii.*

15. **H. Cheesemanii** *Bak. ex Hook. and Bak. Syn. Fil.* edit. 2 (1873) 464.—Minute, forming cushions on the branches of trees, or creeping amongst mosses and hepaticae. Rhizome branched, wide-creeping, smooth and wiry. Fronds very small, ¼–1 in. long, simple or forked or digitately 3–5-fid, quite glabrous, dark-green, texture firm. Stipes very short, filiform ⅛–¼ in. long. Segments about ⅒ in. broad, linear-oblong or ligulate, obtuse, with a single stout dark-coloured costa in each; margins not usually conspicuously thickened, strongly ciliate-dentate; teeth ascending, dark-brown or black, sometimes caducous. Sori 1–3 to a frond, terminating the segments. Indusium slightly sunk in the frond at the base, orbicular-oblong, dark brownish-black, of a more compact texture than the frond, 2-valved nearly to the base; valves smooth, convex, quite entire, recurved in age.—*Ic. Plant.* (1876) t. 1132; *Cheesem. in Trans. N.Z. Inst.* viii (1876) 329; *Thoms. N.Z. Ferns* (1882) 36; *Field N.Z. Ferns* (1890) 65, t. 5, f. 3; *Cheesem. Man. N.Z. Fl.* (1906) 938.

Var. **Armstrongii.**—Precisely similar in size and habit, but texture firmer, and margins strongly thickened.—H. Armstrongii *T. Kirk in Trans. N.Z. Inst.* x (1878) *App.* 43, t. 21A; *Bak. Ic. Plant.* t. 1614. H. melanocheilos *Col. in Trans. N.Z. Inst.* xvii (1885) 255. Trichomanes Armstrongii *Bak. ex Hook. and Bak. Syn. Fil.* edit. 2, 465.

North Island: Auckland—Mongonui County, *H. Carse.* Whangaroa, *R. W. Rowson!* Great Barrier Island, *T. Kirk!* Whangarei, Coromandel, Thames, Waitakere, Hunua, *T. F. C.;* Te Aroha Mountain, *J. Adams!* South Island: Nelson—Mokohinui, *T. Kirk!* Canterbury—Upper Waimakariri and Arthur's Pass, *Armstrong! Enys! T. Kirk! T. F. C.* Westland—Hokitika, *T. Kirk;* Kumara, *J. M. Brame!* Okarito, *A. Hamilton!* Stewart Island: Ruggedy Mountains, *T. Kirk.* Sea-level to 3500 ft.

A peculiar little species, usually found among moss on the upper branches of forest trees, or on the perpendicular faces of rocks. I am unable to maintain *H. Armstrongi* as a separate species, for the stout marginal nerve, which is supposed to separate it from *H. Cheesemanii*, is an inconstant character, and fronds may be picked from the same rhizome with or without it. Usually, however, epiphytic specimens want the nerve, and rupestral ones possess it.

16. **H. minimum** *A. Rich. Fl. Nouv. Zel.* (1832) 91, t. 14, f. 2.—Minute, forming matted patches on rocks or on the trunks of trees. Rhizome much branched, filiform, wide-creeping, glabrous or sparingly bristly. Stipes wiry, filiform, naked, $\frac{1}{6}$–$\frac{1}{2}$ in. long. Fronds very small, $\frac{1}{4}$–$\frac{3}{4}$ in. long, broadly oblong-deltoid or ovate, erect or recurved, firm, pale-green when fresh, often reddish-brown when dry, pinnatifid or pinnate at the base. Segments 2–6 pairs, close, spreading, simple or the lower ones forked, linear, obtuse, more or less concave, rigid, quite glabrous; margins spinulose-dentate. Sori never more than one to a frond, terminating the main rhachis, stipitate, quite free. Indusium rather large, obovate-cuneate, narrowed at the base, 2-valved to the middle; valves spinulose on the back; margins rounded, sharply spinulose-dentate. Receptacle stout, often exserted in age.—*A. Cunn. Precur.* (1836) n. 242; *Raoul Choix* (1846) 39; *Hook. f. Fl. Antarct.* i (1844) 103; *Fl. Nov. Zel.* ii (1855) 12; *Handb. N.Z. Fl.* (1864) 353; *Hook. and Bak. Syn. Fil.* (1873) 464; *Thoms. N.Z. Ferns* (1882) 36; *Cheesem. Man. N.Z. Fl.* (1906) 939.

South Island: Nelson—Tasman Bay, *D'Urville.* Westland—Upper Hokitika Valley and Franz Josef Glacier, *Rev. J. Holloway;* coast near Okarito, *A. Hamilton!* Otago—Resolution Island, *Enys!* East Coast, *Buchanan! A. Hamilton!* Stewart Island: Not uncommon, *T. Kirk!* Auckland Islands: Scarce, *Sir J. D. Hooker.*

A much misunderstood species; most collectors confusing it with small forms of *H. Tunbridgense*, from which, however, it is readily distinguished by the uniformly solitary and terminal sori, the indusium of which is spinulose on the back as well as on the margins.

17. **H. Tunbridgense** *Smith Fl. Brit.* (1794) 1141.—Forming broad densely matted moss-like patches on rocks or on the trunks of trees. Rhizome much branched, long, wiry, creeping. Fronds variable in size, $\frac{1}{2}$–3 in. long, $\frac{1}{2}$–1 in. broad, oblong or linear-oblong, pale-green, membranous, pinnate below, pinnatifid above. Stipes $\frac{1}{2}$–$1\frac{1}{2}$ in. long, slender, wiry, naked; rhachis winged above, wingless below, or sometimes the wing is decurrent almost to the lowest pinna. Pinnae spreading, close or rather remote, usually flabellately pinnatifid. Segments 3–12 to a pinna, linear, obtuse, flat, conspicuously spinulose-dentate. Sori terminal on a short lateral segment near the base of the pinnae on their upper margin and hence supra-axillary, rarely more than one to a pinna. Indusium suborbicular, compressed, its base slightly immersed in the segment, deeply 2-valved; valves thin, smooth on the back; margins conspicuously spinulose-dentate.—*A. Rich. Fl. Nouv. Zel.* (1832) 91; *A. Cunn. Precur.* (1836) n. 243; *Raoul Choix* (1846) 39; *Hook. Sp. Fil.* i (1846) 95; *Hook. f. Fl. Nov. Zel.* ii (1855) 11; *Handb. N.Z. Fl.* (1864) 352; *Hook. and Bak. Syn. Fil.* (1873) 67; *Thoms. N.Z. Ferns* (1882) 35; *Field N.Z. Ferns* (1890) 65, t. 14, f. 7; *Cheesem. Man. N.Z. Fl.* (1906) 939. H. pusillum *Col. in Trans. N.Z. Inst.* xii (1880) 365. (?) H. pygmaeum *Col. l.c.* xiii (1881) 376. H. zeelandicum *Van der Bosch Ned. Arch.* (1856) 77.

Var. **cupressiforme** *Hook. f. Fl. Nov. Zel.* ii (1855) 11.—Fronds taller and narrower, more erect, 1–4 in. high. Pinnae distant; segments more rigid, narrower, often

decurved. Sori free, almost stipitate.—H. cupressiforme *Labill. Pl. Nov. Holl.* ii (1806) 102, t. 250. H. revolutum *Col. in Tasm. Journ. Nat. Sci.* (1846) 186.

North and South Islands, Stewart Island, Auckland Islands: Abundant throughout. Sea-level to 3000 ft.

An abundant plant in most temperate and subtropical countries, and everywhere highly variable. Var. *cupressiforme* has much of the habit of the next species, but the valves of the indusium are spinulose-dentate.

18. **H. peltatum** *Desv. Prodr.* (1827) 333.—Forming large patches on the ground among moss or on the roots of trees. Rhizome long, creeping, branched. Fronds 1–4 in. long, linear-oblong, dark-green, rigidly membranous, pinnate below, pinnatifid above. Stipes $\frac{1}{2}$–$1\frac{1}{2}$ in. long, slender, wiry, naked; rhachis winged in the upper portion only. Pinnae narrower and more rigid than in *H. Tunbridgense*, often pinnatifid on the upper side alone. Segments fewer and narrower, frequently decurved, usually involute, margins conspicuously spinulose-dentate. Sori terminal on short lateral segments near the base of the pinnae on their upper margin, exactly as in *H. Tunbridgense*. Indusium obovate-oblong or broadly oblong, turgid, slightly immersed at the base, deeply 2-valved; valves smooth; margins quite entire.—H. unilaterale *Willd. Sp. Plant.* v (1810) 521; *Hook. f. Fl. Nov. Zel.* ii (1855) 11; *Handb. N.Z. Fl.* (1864) 353; *Cheesem. Man. N.Z. Fl.* (1906) 940. H. Wilsoni *Hook. Brit. Fl.* edit. 1 (1830) 446; *Sp. Fil.* i (1846) 95. H. Tunbridgense *var.* Wilsoni *Hook. and Bak. Syn. Fil.* (1873) 67.

North and South Islands, Stewart Island: From Te Aroha Mountain southwards, not common, chiefly in mountain forests. Sea level to 3500 ft.

Very closely allied to *H. Tunbridgense*, and sometimes hardly to be distinguished from it in the absence of fruit, but usually the frond is taller and narrower and more rigid, the pinnae are sparingly divided and decurved, the segments often unilateral, and the indusia narrower and more turgid, with the margins of the valves quite entire. Its geographical range is nearly the same as that of *H. Tunbridgense*, but it is a much less abundant plant.

19. **H. multifidum** *Swartz Syn. Fil.* (1806) 149.—Forming matted patches upon the ground or on the trunks or branches of trees. Rhizome much branched, creeping, wiry. Fronds variable in size, usually 4–8 in. high including the stipes, but sometimes dwarfed to 1 in., and occasionally attaining 12 in., ovate-lanceolate to oblong-ovate or deltoid, acute or acuminate, erect or decurved or even pendulous, dark olive-green to light-green, membranous, 3–4-pinnatifid. Stipes 1–5 in. long, terete, wiry, naked; rhachis narrowly winged above. Primary pinnae close and often overlapping in terrestrial specimens, more remote in those growing on trees, rhomboidal-lanceolate, cut down to a rather broadly winged rhachis into numerous secondary divisions, which are again pinnatifid or 2-pinnatifid. Ultimate segments linear, rigid, obtuse, deeply spinulose-dentate. Sori few, large, mostly in the upper part of the frond, terminating very short lateral segments, often appearing quite axillary, free. Indusium erect or decurved, obovoid, tubular below, 2-valved to the middle; valves entire or denticulate.—*A. Cunn. Precur.* (1836) n. 240; *Raoul Choix* (1846) 39; *Hook. and Grev. Ic. Fil.* (1829) t. 167; *Hook. Sp. Fil.* i (1846) 98; *Hook. f. Fl. Nov. Zel.* ii (1855) 12; *Handb. N.Z. Fl.* (1864) 353; *Hook. and Bak. Syn. Fil.* (1873) 69; *Cheesem. Man. N.Z. Fl.* (1906) 940; *Thoms. N.Z. Ferns* (1882) 37; *Field N.Z. Ferns* (1890) t. 19, f. 8. H. truncatum *Col. in Trans. N.Z. Inst.* xxiii (1891) 390. H. alpinum *Col. l.c.* xxxi (1899) 263. H. oligocarpum *Col. l.c.* xxxi (1899) 264. Trichomanes multifidum *Forst. f. Prodr.* (1786) 85.

North and South Islands, Stewart Island, Chatham Islands, Auckland and Campbell Islands, Antipodes Island: Abundant throughout. Sea-level to 4000 ft.

Varying greatly in size and habit, but always easily recognized by the very peculiar indusium. It is also found in Fiji and others of the Pacific islands.

20. **H. bivalve** *Swartz Syn. Fil.* (1806) 146.—Forming large matted patches on the ground among moss, more rarely epiphytical. Rhizome stout, wiry, creeping; rootlets densely villous. Fronds (including the stipes) usually from 6–9 in. high, 2–4 in. broad, but luxuriant specimens reach 12–14 in., with a breadth of 6 in., broadly ovate or deltoid, acuminate, rather rigid, often decurved, 3–4-pinnatifid. Stipes 2–5 in. long, terete, wiry, glabrous, not winged; rhachis narrowly winged above. Primary pinnae triangular or ovate-lanceolate, acuminate, cut down almost to the rhachis into rhomboidal-lanceolate secondary divisions, which are again pinnatifid or 2-pinnatifid. Ultimate segments narrow-linear, obtuse, deeply spinulose-dentate. Sori usually numerous, terminal on the segments, immersed at the base. Indusium ovate or ovate-orbicular, cuneate below, 2-valved nearly to the base; valves quite entire.—*A. Rich. Fl. Nouv. Zel.* (1832) 93; *A. Cunn. Precur.* (1836) n. 244; *Raoul Choix* (1846) 39; *Hook. Sp. Fil.* i (1846) 98, t. 35D; *Hook. f. Fl. Nov. Zel.* ii (1855) 12; *Handb. N.Z. Fl.* (1864) 353; *Hook. and Bak. Syn. Fil.* (1873) 69; *Thoms. N.Z. Ferns* (1882) 37; *Field N.Z. Ferns* (1890) 67, t. 17, f. 3; *Cheesem. Man. N.Z. Fl.* (1906) 941. H. spathulatum *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 184. Trichomanes bivalve *Forst. f. Prodr.* (1786) n. 466.

North Island: Hilly forests from the Great Barrier Island (*C. P. Winkelmann !*) and Cape Colville southwards, not common to the north of the East Cape. South Island, Stewart Island, Chatham Islands: Not uncommon throughout. Sea-level to 3000 ft.

Allied to *H. multifidum*, but a larger and less rigid plant, of a paler-green colour, and with smaller indusia immersed in the tips of the segments, not axillary. It is said to be found in New South Wales.

2. **TRICHOMANES** Smith.

Ferns, usually of small size. Rhizome slender or rather stout, often much branched, glabrous or tomentose. Fronds compound or rarely simple and entire, of the same delicately membranous texture as *Hymenophyllum*, often pellucid, usually of a single layer of cells, rarely of 3-6 layers. Ultimate segments linear or narrow-oblong, entire or rarely toothed at the margin, with a stout central costa. Sori marginal, terminal or lateral, more or less immersed in the frond or quite free, always terminating a vein. Indusium tubular or trumpet-shaped, truncate at the mouth or with a narrow spreading lip or border, usually of the same texture as the frond. Receptacle elongated, filiform or columnar, usually exserted beyond the indusium. Sporangia sessile, depressed, surrounded by a broad complete horizontal ring, bursting transversely.

A genus of nearly 200 species, of almost precisely the same geographical range as *Hymenophyllum*, and agreeing with it in habit and in the delicate texture of the frond, but differing in the shape of the indusium, which is cylindrical or urceolate, and either truncate at the mouth or very shallowly 2-lipped. Of the 7 species found in New Zealand, 3 appear to be endemic, 3 occur in the Polynesian islands, one of them extending as far north as Java and Formosa, the remaining one is found in Australia and Tasmania.

* Fronds simple and entire.

Fronds 2–4 in. diam., broadly reniform with a deep sinus .. 1. *T. reniforme.*

** Fronds small, ½–4 in. long, usually pendulous, delicately membranous, pinnately or 2-pinnately divided; divisions comparatively few.

Fronds ¾–1½ in., digitately or flabellately divided, margins ciliated with branched rufous hairs. Indusium obconical, immersed 2. *T. Lyallii.*

Fronds 1–3 in., dull dark-green, irregularly 2-pinnatifid, segments with a single unbranched costa .. .. 3. *T. humile.*

Fronds 1–4 in., pale-green, irregularly 2-pinnatifid, costa of the segments giving off numerous dichotomous veinlets .. .. 4. *T. venosum.*

Fronds 1–4 in., dark-green, 2–3-pinnately divided; rhachis not winged. Segments very narrow-linear, acute; costa not branched .. .. 5. *T. Colensoi.*

*** Fronds larger, 4–9 in. long, rigidly erect, subcoriaceous, 3–4-pinnatifid; divisions numerous.

Fronds lanceolate, pale yellow-green; ultimate segments narrow-linear, obtuse .. .. 6. *T. strictum.*

Fronds ovate-deltoid, dark-green; ultimate segments broad, oblong, incised at the tips .. .. 7. *T. elongatum.*

1. **T. reniforme** *Forst. f. Prodr.* (1786) n. 462.—Creeping over the ground in moist forests, or clothing the trunks of trees and rotten logs. Rhizome stout, hard, rigid, wide-creeping; rootlets woolly. Stipes 2–8 in. long, erect, wiry, glabrous. Fronds 2–4 in. broad, quite entire, broadly reniform with a deep sinus, dark-green and translucent when fresh, brown and almost horny when dry, flat or undulate, glossy, quite glabrous; veins radiating from the base, numerous, close, prominent, repeatedly dichotomous, spurious venules wanting. Sori very numerous, crowded, often encircling the whole of the margin of the frond. Indusium narrow cup-shaped or almost bell-shaped. Receptacle far-exserted, stout, columnar, covered with sporangia.—*A. Rich. Fl. Nouv. Zel.* (1832) 95; *A. Cunn. Precur.* (1836) n. 228; *Raoul Choix* (1846) 48; *Hook. Sp. Fil.* i (1846) 115; *Exotic Ferns* (1827) t. 2; *Hook. and Grev. Ic. Fil.* (1829) t. 31; *Hook. f. Fl. Nov. Zel.* ii (1855) 16; *Handb. N.Z. Fl.* (1864) 356; *Hook. and Bak. Syn. Fil.* (1873) 73; *Thoms. N.Z. Ferns* (1882) 46; *Field N.Z. Ferns* (1890) 68, t. 2, f. 3; *Cheesem. Man. N.Z. Fl.* (1906) 943. Cardiomanes reniforme *Presl Hym.* (1843) 12.

North and South Islands, Stewart Island, Chatham Islands: From the North Cape southwards, abundant in damp woods, except on the eastern side of Canterbury, Otago, and Stewart Island, where it is rare and local. Sea-level to 3000 ft. *Kidney-fern; Raurenga.*

A very distinct and beautiful species, quite unlike any other. The frond differs from that of all the other species in having from 4 to 6 layers of cellules. It is confined to New Zealand, its reported occurrence in Australia (Handb. N.Z. Fl. 747) not having been confirmed.

2. **T. Lyallii** *Hook and Bak. Syn. Fil.* (1873) 77.—Small, pendulous, very delicate, clothing the trunks of trees in damp forests. Rhizome branched, creeping, capillary, sparingly clothed with simple or stellate red-brown hairs. Stipes 1–2 in. long, very slender, filiform. Fronds ¾–1½ in. long and broad, deltoid or suborbicular in outline, delicately membranous and diaphanous, digitately or flabellately divided almost to the base. Segments simple or dichotomously branched, linear, obtuse, flat, minutely denticulate; margins ciliated with branched rufous hairs. Sori few or many to a frond, deeply sunk in the tips of the segments. Indusium obconical, the width of the mouth about equalling the depth of the tube;

margins ciliated, not dilated nor bordered. Receptacle included.—*Thoms. N.Z. Ferns* (1882) 45; *Field N.Z. Ferns* (1890) 70, t. 5, f. 4; *Cheesem. Man. N.Z. Fl.* (1906) 943; *Ill. N.Z. Fl.* ii (1914) t. 236. Hymenophyllum Lyallii *Hook. f. Fl. Nov. Zel.* ii (1855) 16; *Handb. N.Z. Fl.* (1864) 355.

North and South Islands.—From the Great Barrier Island and Cape Colville southwards, not uncommon in dense moist forests, but rare or absent on the east coast of the South Island, plentiful in Westland and the south-west of Otago. Stewart Island: Mount Anglem, *T. Kirk.* Sea-level to 3000 ft.

Exactly intermediate between *Trichomanes* and *Hymenophyllum*, so far as the structure of the indusium is concerned. It is purely a matter of taste as to which genus it should be referred to.

3. **T. humile** *Forst. f. Prodr.* (1786) n. 464.—Small, pendulous from the faces of rocks or bank-sides. Rhizomes much branched, slender, creeping, intermatted. Stipes short, slender, $\frac{1}{4}$–$\frac{1}{2}$ in. long, winged almost to the base. Fronds 1–3 in. long, $\frac{1}{4}$–$\frac{2}{3}$ in. broad, lanceolate or linear-oblong, quite glabrous, membranous, dark dull-green, irregularly 2-pinnatifid; rhachis winged throughout. Pinnae ascending, forked or again pinnatifid. Ultimate segments linear, flat, obtuse, quite entire, a single costa in each segment, spurious venules wanting. Sori solitary, sunk in the tip of a short lateral segment and on the upper side of a pinna near its base. Indusium tubular or trumpet-shaped; mouth expanded, shortly 2-lipped. Receptacle usually exserted as a long capillary bristle.—*Hook. f. Ic. Fil.* (1829) t. 35; *Hook. Sp. Fil.* i (1846) 123; *Hook. f. Fl. Nov. Zel.* ii (1855) 16; *Handb. N.Z. Fl.* (1864) 356; *Hook. and Bak. Syn. Fil.* (1873) 80; *Thoms. N.Z. Ferns* (1882) 46; *Field N.Z. Ferns* (1890) 70, t. 5, n. 8; *Cheesem. Man. N.Z. Fl.* (1906) 944.

North Island: From the Kermadec Islands (*W. R. B. Oliver!*) southwards, not uncommon in dark woods. South Island: Nelson—Happy Valley, *A. Grant.* Marlborough—Queen Charlotte Sound, *Banks* and *Solander.* Canterbury—Banks Peninsula, *Armstrong.* Sea-level to 2000 ft.

Also in Australia and the Pacific islands, stretching northwards to New Guinea, Java, and Formosa.

4. **T. venosum** *R. Br. Prodr.* (1810) 159.—Pendulous, usually clothing the trunks of tree-ferns. Rhizome long, slender, branched, wide-creeping, densely tomentose. Stipes $\frac{1}{2}$–2 in. long, very slender, capillary, naked. Fronds 1–4 in. long, $\frac{3}{4}$–$1\frac{1}{2}$ in. broad, linear or lanceolate to oblong, very delicate and membranous, translucent, pale-green, shining, quite glabrous, pinnate; rhachis broadly winged above, naked below. Pinnae 4–8 pairs, very variable in shape and amount of cutting, from linear and undivided to rhomboidal-lanceolate and deeply and irregularly pinnatifid. Segments or lobes flat, obtuse, irregularly sinuate; costa flexuous, with numerous alternate once or twice dichotomous secondary veinlets. Sori generally solitary on each pinna and sunk in a short lobe on the upper margin near the base, but in specimens with broad lower pinnae there may be 2–4 sori placed irregularly on both the upper and lower margins. Indusium tubular; mouth dilated all round, entire or very slightly 2-lipped. Receptacle usually exserted, capillary.—*A. Cunn. Precur.* (1836) n. 229; *Raoul Choix* (1846) 38; *Hook. Sp. Fil.* i (1846) 132; *Hook. and Grev. Ic. Fil.* (1829) t. 78; *Hook. f. Fl. Nov. Zel.* ii (1855) 17; *Handb. N.Z. Fl.* (1864) 367; *Hook. and Bak. Syn. Fil.* (1873) 82; *Benth. Fl. Austral.* vii (1878) 702; *Thoms. N.Z. Ferns* (1882) 47; *Field N.Z. Ferns* (1890) 71, t. 14, f. 4;

Cheesem. Man. N.Z. Fl. (1906) 944. T. venustula *Col. in Trans. N.Z. Inst.* xii (1880) 366.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant in moist forests throughout. Sea-level to 2500 ft.

Also in south-eastern Australia and Tasmania. Mr. Colenso's *T. venustulum* is simply a small state with broader lower pinnae sometimes bearing 2–4 sori.

5. **T. Colensoi** *Hook. f. Ic. Plant.* (1854) t. 979.—Pendulous from rocks or from the trunks of trees. Rhizome wide-creeping, branched, capillary, more or less tomentose. Stipes short, slender, naked. Fronds rather distant, 2–5 in. long, ½–1 in. broad, oblong-lanceolate or linear-oblong, acuminate, quite glabrous, membranous, dark-green, 3-pinnatifid; rhachis slender, not winged. Primary pinnae 5–12 pairs, remote, shortly stalked, pinnate at the base, pinnatifid above. Ultimate segments very narrow-linear, acute, quite entire; a central costa only in each segment. Sori solitary on the upper side of a pinna near its base and thus appearing axillary, erect, stipitate, quite free. Indusium tubular, the mouth slightly dilated. Receptacle usually exserted as a long capillary bristle.—*Hook. f. Fl. Nov. Zel.* ii (1855) 17; *Handb. N.Z. Fl.* (1864) 357; *Hook. and Bak. Syn. Fil.* (1873) 85; *Thoms. N.Z. Ferns* (1882) 47; *Field N.Z. Ferns* (1890) 71, t. 22, f. 3; *Cheesem. Man. N.Z. Fl.* (1906) 945; *Ill. N.Z. Fl.* ii (1914) t. 236.

NORTH ISLAND: On mossy stones and rocks, not common. Auckland—Ravines at Mamaku, near Rotorua, *J. Stewart!* Lake Waikaremoana, *Colenso!* Taranaki—Mount Egmont Ranges, *J. M. Brame.* Wellington — Tararua Ranges, *Buchanan!* SOUTH ISLAND: Nelson—Near Collingwood, *Travers, Dall!* Takaka Valley and West Wanganui, *Kingsley.* Canterbury—Banks Peninsula, *Armstrong.* Westland — Very abundant on main ranges, *Holloway;* near Okarito, *A. Hamilton!* Otago—Vicinity of Dunedin, *Buchanan! A. Hamilton!* Lake Wanaka, *Haast!* Milford Sound, *Cockayne.* Sea-level to 3,000 ft.

Well distinguished by the finely cut fronds with distant pinnae and very narrow-linear acute segments. Its nearest ally is the South American *T. capillaceum* L.

6. **T. strictum** *Menz. ex Hook. and Grev. Ic. Fil.* (1829) t. 122.—Rhizome very short, erect or inclined, stout, woody, emitting many long wiry rootlets. Fronds numerous, crowded at the top of the rhizome. Stipes 2–4 in. long, stiff, erect, terete, naked or narrowly margined above, furnished with a tuft of red-brown bristles at the base. Fronds 3–6 in. long, 1½–2½ in. broad, lanceolate or linear-oblong, acuminate, rigidly erect, yellowish-green, 3–4-pinnatifid; rhachis narrowly winged throughout or the wing evanescent in the lower part. Primary pinnae close-set, lanceolate, ascending or spreading, the lower sometimes reduced in size; secondary pinnatifid. Ultimate segments narrow-linear, flat, entire, glabrous; texture firm; costa stout, unbranched. Sori usually not very numerous, terminating short segments near the base of the upper margin of the secondary pinnae. Indusium quite free, erect, funnel-shaped, mouth dilated all round. Receptacle exserted, capillary.—*A. Rich. Fl. Nouv. Zel.* (1832) 95; *Hook. Sp. Fil.* i (1846) 136; *Hook. f. Fl. Nov. Zel.* ii (1855) 17; *Handb. N.Z. Fl.* (1864) 356; *Hook. and Bak. Syn. Fil.* (1873) 466; *Thoms. N.Z. Ferns* (1882) 47; *Cheesem. Man. N.Z. Fl.* (1906) 945. T. leptophyllum *A. Cunn. Precur.* (1836) n. 232; *Raoul Choix* (1846) 38. T. Cunninghamii *Van der Bosch.* T. rigidum *var.* strictum *Field N.Z. Ferns* (1890) 72, t. 28, f. 3.

NORTH ISLAND: Damp forests from Kaitaia southwards to Wellington, but far from common; summit of Little Barrier Island, *T. F. C.* SOUTH ISLAND: Nelson—

Massacre Bay, *Lyall, Travers;* Takaka and West Wanganui, *Kingsley.* Westland—Kumara, *J. M. Brame!* Okarito, *A. Hamilton!* Otago—Dusky Sound, *Hector* and *Buchanan, Holloway.* Stewart Island: *Cockayne;* Ulva, rare, *Kirk.* Sea-level to 3000 ft.

Confined to New Zealand, but very closely allied to the widely spread *T. rigidum* Swartz.

7. **T. elongatum** *A. Cunn. Precur.* (1836) n. 231.—Rhizome short, stout, erect or inclined, clothed with the bases of the old stipites; rootlets many, rigid and wiry. Fronds 4–8 at the top of the rhizome. Stipes 3–9 in. long, stout, rigid, terete, rough below and furnished at the very base with a tuft of linear bristles, not winged above. Fronds 3–8 in. long, 1½–3 in. broad, ovate-deltoid, acuminate, rigid, dark olive-green, often coated on the upper surface with mosses and hepaticae, 2–3-pinnatifid; main rhachis scarcely winged except at the very top. Primary pinnae close, rhomboidal-lanceolate, pinnate at the base, pinnatifid above; secondary imbricating, oblong-cuneate, deeply incised or pinnatifid. Ultimate segments or lobes rather broad, usually incised at the tips, the teeth acute; veins stout, branching, one to each tooth. Sori numerous, in the axils of the lobes of the secondary pinnae. Indusium narrow funnel-shaped, quite free; mouth scarcely dilated, entire or very slightly 2-lipped. Receptacle stout, rigid, exserted.—*Raoul Choix* (1846) 48; *Hook. Ic. Plant.* viii (1854) t. 701; *Sp. Fil.* i (1846) 134; *Hook. f. Fl. Nov. Zel.* ii (1855) 17; *Handb. N.Z. Fl.* (1864) 356; *Cheesem. Man. N.Z. Fl.* (1906) 946. T. rigidum *var.* elongatum *Hook. and Bak. Syn. Fil.* (1873) 86; *Thoms. N.Z. Ferns* (1882) 48; *Field N.Z. Ferns* (1890) 73, t. 16, f. 2. T. polyodon *Col. in Trans. N.Z. Inst.* xxviii (1896) 618.

North Island: Dark woods, abundant to the north of the East Cape, from thence rare and local southwards to Cook Strait. South Island: Nelson—Collingwood, *D. Grant;* Takaka and West Wanganui, *Kingsley;* Giles Creek and Buller Valley, *W. Townson!* Marlborough—Queen Charlotte Sound, *Banks* and *Solander.* Canterbury—Banks Peninsula, *Armstrong.* Sea-level to 2500 ft.

Closely allied to the widely distributed *T. rigidum* Swartz, and considered to be a variety of it by Mr. Baker and other pteridologists. But the frond is broader and more deltoid, the rhizome is not creeping, and the stipes and rhachis quite wingless; the pinnae are more imbricate and less divided, and the segments are broader and shorter. It is also found in the New Hebrides and New Caledonia.

3. **LOXSOMA** R. Br.

Rhizome stout, woody, creeping, paleaceous. Fronds erect, coriaceous, opaque, quite glabrous, 3–4-pinnate; stipes long. Veins free, not anastomosing. Sori marginal, in a sinus of the teeth or lobes of the frond, terminating a vein. Indusium cup-shaped or almost urceolate, coriaceous; mouth truncate, entire. Receptacle long, columnar, exserted. Sporangia numerous, mixed with jointed hairs, obovoid or pyriform, girt by a complete oblique ring, bursting vertically.

A genus of a single species, endemic in the northern portion of the Dominion.

1. **L. Cunninghamii** *R. Br. ex A. Cunn. Precur.* (1836) n. 215, t. 31, 32.—Rhizome long, stout, tortuous, densely clothed with linear red-brown hairs. Stipes 1–2 ft. high, erect, pale-brown, glabrous, smooth and polished. Fronds 9–24 in. long, 6–12 in. broad, broadly triangular, coriaceous, dark-green above, glaucous-white or pale-green beneath; rhachis polished, channelled. Primary pinnae rather distant, ascending, the upper alternate, the

lowermost opposite; secondary ovate-lanceolate or lanceolate, pinnate below, pinnatifid above. Ultimate segments oblong, subacute, toothed or notched. Sori inserted in the notches, the indusium pointing backwards from the frond.—*Raoul Choix* (1846) 48; *Hook. Gen. Fil.* (1842) t. 15; *Sp. Fil.* i (1846) 86; *Garden Ferns* (1862) t. 31; *Hook. f. Fl. Nov. Zel.* ii (1855) 18; *Handb. N.Z. Fl.* (1864) 368; *Hook. and Bak. Syn. Fil.* (1873) 56; *Thoms. N.Z. Ferns* (1882) 33; *Field N.Z. Ferns* (1890) 55, t. 12, f. 1; *Cheesem. Man. N.Z. Fl.* (1906) 947. Trichomanes coenopteroides *Harv. ex A. Cunn. Precur.* (1836) n. 215. Davallia dealbata *A. Cunn. Precur. l.c.*

North Island: Auckland—In woods from Mangonui and Kaitaia southwards to Te Aroha, not common. Most often seen in the heart of the Cape Colville Peninsula. Sea-level to 1200 ft.

A very remarkable fern, with the habit of a coriaceous *Davallia* or *Dicksonia*, and the sorus of a *Trichomanes*. But the sporangia differ widely from those of *Trichomanes* in having an oblique ring, and the dehiscence is vertical, like that of *Gleichenia* and *Schizaea*. It has generally been placed in the tribe *Hymenophyllaceae*, but the investigations of Professor Bower (Phil. Trans. cxcii, 47 to 52) seem to prove that Presl and Bommer were right in regarding it as constituting a distinct tribe, having affinities with *Gleichenia* and *Schizaea* on the one hand, and on the other with the *Hymenophyllaceae* and *Dennstaedia*.

4. **DICKSONIA** L'Herit.

Usually tree-ferns, but in some species the caudex is short or absent. Fronds large 2–3-pinnate. Stipes smooth or muricate. Veins pinnately forked, veinlets always free. Sori near the margin of the frond, globose, placed on the apex of a veinlet; receptacle more or less elevated. Indusium distinctly 2-valved, the upper valve continuous with the margin of the frond and usually similar to it in texture, consisting of an incurved or concave lobule; lower valve membranous or coriaceous. Sporangia numerous, sessile or nearly so, bursting transversely; ring oblique, complete.

Excluding the sections *Cibotium* and *Patania* (*Dennstaedtia* Bernh.), which seem to be more appropriately kept separate, the genus contains about 17 species, widely dispersed through the tropical and subtropical regions of both hemispheres. The 3 New Zealand species are endemic, but one of them differs but slightly from the Australian *D. antarctica* Labill.

Trunk 6–20 ft., slender, black. Stipes blackish-brown, tubercled. Sori 6–12 on each segment	1. *D. squarrosa.*
Trunk 6–20 ft., very stout, brown. Stipes short, pale-brown, smooth. Sori 3–6 to each segment	2. *D. fibrosa.*
Trunk wanting or very short. Stipes long, smooth, pale. Sori 6–12 to each segment	3. *D. lanata.*

1. **D. squarrosa** *Swartz Syn. Fil.* (1806) 136.—Trunk 6–20 ft. high, slender, black or dark-brown, clothed above with the persistent bases of the old stipites. Fronds 4–8 ft. long, rarely more, 2–3½ ft. broad, oblong-lanceolate, 2–3-pinnate, rigid and coriaceous. Stipes slender, dark-brown or black at the base, paler above, when young clothed with long brownish-black hairs or setae, almost glabrous when old, sides and under-surface rough with numerous small tubercles; rhachis and costae clothed with deciduous reddish-brown wool above, rough with minute tubercles beneath. Primary pinnae 10–20 in. long, 3–5 in. broad, oblong-lanceolate, acuminate; secondary 1½–3 in. long, ¼–½ in. broad, deeply pinnatifid. Barren segments ovate or oblong, rigid, sharply toothed, the teeth almost pungent; fertile smaller and much contracted, pinnatifid. Sori copious, covering the whole

under-surface of the frond, 5–12 on each segment or 1 to each lobule. Indusium rather large, both valves concave.—*A. Cunn. Precur.* (1836) n. 216; *Raoul Choix* (1846) 38; *Hook. Sp. Fil.* i (1846) 68; *Hook. f. Fl. Nov. Zel.* ii (1855) 9; *Handb. N.Z. Fl.* (1864) 361; *Hook. and Bak. Syn. Fil.* (1873) 51; *Thoms. N.Z. Ferns* (1882) 31; *Field N.Z. Ferns* (1890) 50, t. 10, f. 6, *and* t. 25, f. 6; *Cheesem. Man. N.Z. Fl.* (1906) 953. D. gracilis *Col. in Trans. N.Z. Inst.* xv (1883) p. 306. Trichomanes squarrosum *Forst. f. Prodr.* (1786) n. 476.

North and South Islands, Stewart Island, Chatham Islands.—Abundant in woods throughout. Sea-level to 2500 ft. *Weki* or *Wheki.*

Easily recognized by the slender blackish trunk, harsh and coriaceous fronds, dark-coloured stipes rough with small tubercles beneath, and rather large copious sori. The trunk is occasionally branched and sometimes produces numerous adventitious buds along its whole length, crowned with miniature fronds. A form possessing this peculiarity, and with the fronds rather narrower and more finely cut than usual, was described by Mr. Colenso as a distinct species under the name of *D. gracilis.* I cannot separate it even as a variety.

2. **D. fibrosa** *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 179.—Trunk 8–20 ft. high, stout, columnar, everywhere thickly coated with matted fibrous aerial rootlets, giving it a diameter when mature of from 1–2 ft., clothed towards the top with the old pendent withered fronds. Fronds numerous, 30 or more, spreading, 4–8 ft. long, 1½–2 ft. broad, lanceolate, 2–3-pinnate, coriaceous but not so much so as in *D. squarrosa.* Stipes very short, clothed at the base with dense bright red-brown fibrillose scales; rhachis and costae pale-brown, smooth, densely pilose on both surfaces with soft brownish hairs. Primary pinnae 4–10 in. long, 1½–2½ in. broad, lanceolate, acuminate or almost caudate; secondary ¾–1½ in. long, ¼–½ in. broad, linear or linear-oblong, pinnatifid or pinnate at the very base. Segments rather close, falcate, acute; the barren ones larger and broader, almost flat, acutely coarsely toothed; fertile smaller, contracted, concave, obtusely pinnatifid. Sori very numerous, covering the whole under-surface of the frond, small, 3–6 to each segment or 1 to each lobule.—*Hook. Sp. Fil.* i (1846) 68, t. 23B; *Hook. and Bak. Syn. Fil.* (1873) 461; *Field N.Z. Ferns* (1890) 51, t. 10, f. 5, *and* t. 25, f. 1; *Cheesem. Man. N.Z. Fl.* (1906) 953. D. antarctica *Hook. f. Fl. Nov. Zel.* ii (1855) 10; *Handb. N.Z. Fl.* (1864) 351; *Thoms. N.Z. Ferns* (1882) 31 (*not of Labill.*). D. intermedia *Col. ex Hook. and Bak. Syn. Fil.* (1873) 461. D. Sparrmanniana *Col. in Trans. N.Z. Inst.* xii (1880) 364. D. microcarpa *Col. in Trans. N.Z. Inst.* xx (1888) 214.

North and South Islands: From Tauranga and the Middle Waikato southwards, abundant in forests. Chatham Islands: *Miss Seddon!* Sea-level to 2500 ft. *Weki-ponga; Kuripaka.*

Very close indeed to the Australian *D. antarctica,* but a much smaller plant, with densely pilose rhachides and costae, and smaller sori. Mr. Colenso's *D. Sparrmanniana* is a short-trunked form with rather broader fertile segments; and his *D. microcarpa* has smaller and more finely cut fronds, with smaller sori; but they both merge gradually into the ordinary form. The Maoris formerly sliced the fibrous outside of the trunk into slabs, and used them in the construction of their food-houses, for the purpose of excluding rats.

3. **D. lanata** *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 181.—Caudex usually long, prostrate and rooting, as thick as the wrist; more rarely short, stout, erect, and attaining a height of 3–6 ft. Fronds few, 3–6 ft. long, 1–3 ft. broad, ovate or ovate-lanceolate, acuminate, 2–3-

pinnate, thick and coriaceous but hardly rigid, yellowish-green above, paler beneath. Stipes from half as long to as long as the frond, pale, smooth, clothed at the base with long purplish-brown or yellowish-brown fibrillose scales, when young more or less covered (together with the rhachis and costae) with soft woolly deciduous hairs, almost glabrous when mature. Primary pinnae 6–12 in. long, 2–4 in. broad, oblong-lanceolate, acuminate; secondary 1–3 in. long, $\frac{1}{3}$–$\frac{2}{3}$ in. broad, pinnate or pinnatifid. Segments or pinnules rather closely set, slightly falcate; barren oblong or ovate, obtusely or acutely toothed or lobulate; fertile smaller and narrower, deeply pinnatifid. Sori copious, 6–12 to a segment or 1 to each lobule.—*Hook. Sp. Fil.* i (1846) 59, t. 23c; *Hook. f. Fl. Nov. Zel.* ii (1855) 10; *Handb. N.Z. Fl.* (1864) 351; *Hook. and Bak. Syn. Fil.* (1873) 461; *Thoms. N.Z. Ferns* (1882) 31; *Field N.Z. Ferns* (1890) 53, t. 11, f. 1A, 1B, 1C; *Cheesem. Man. N.Z. Fl.* (1906) 954. D. laevis *Heward ex Sp. Fil.* i (1846) 69.

At Whangarei, Bay of Islands, and other northern localities this usually produces a short stout trunk, but to the south of Auckland it is invariably stemless. Possibly there may be two distinct varieties with a different geographical range, but so far I have failed to find distinctive characters to separate them.

North Island: Hilly forests from Mangonui to Cook Strait, not common. South Island: Nelson—Massacre Bay, *Travers;* Pakawau, *Kingsley!* Westland—Okarito, *A. Hamilton!* Franz Josef Glacier, *Cockayne!* Canterbury—Banks Peninsula, *Armstrong.* Sea-level to 2000 ft.

5. **CYATHEA** Smith.

Tree-ferns, the New Zealand species with a trunk or caudex varying from 10–50 ft. or even more. Fronds very large, usually 2–3-pinnate, very rarely (in species not found in New Zealand) pinnate or undivided. Stipes often muricate or aculeate. Sori dorsal, globose, situated upon a vein or at the fork of a vein; receptacle elevated, globose or elongated. Indusium globose, at first covering the whole sorus, but soon bursting at the summit, often in an irregular manner, usually persistent as a cup surrounding the base of the sorus, its margin entire or laciniate. Sporangia numerous, sessile or nearly so, often mixed with jointed hairs, bursting transversely; ring somewhat oblique, usually complete.

A large and beautiful genus of over 150 species, most plentiful in damp tropical or subtropical regions, unknown in the North Temperate Zone. It attains its southern limit in New Zealand. Of the 4 species found therein, 2 appear to be endemic; the remaining 2 extend to Australia or the Pacific islands.

* Under-surface of frond white.

Trunk 10–30 ft. Fronds 6–12 ft.; stipes and rhachis clothed with yellowish-brown deciduous tomentum .. .. .. 1. *C. dealbata.*

** Under-surface of frond green.

Trunk 20–50 ft. Fronds 8–20 ft., coriaceous; stipes and rhachis conspicuously muricate beneath. Fertile segments lobulate or pinnatifid .. .. 2. *C. medullaris.*

Trunk slender, 20–50 ft. Fronds 8–20 ft., submembranous; stipes and rhachis only slightly asperous. Divisions of frond with attenuated points .. .. 3. *C. Kermadecensis.*

Trunk stout, 8–12 ft. Fronds 8–15 ft.; stipes and rhachis with hard tubercles. Divisions of frond not drawn out into attenuated points .. .. 4. *C. Milnei.*

Trunk 8–20 ft. Fronds 6–10 ft., almost membranous; stipes and rhachis slightly asperous, clothed with strigose hairs above. Fertile segments lobulate or pinnatifid .. .. .. 5. *C. Cunninghamii.*

1. **C. dealbata** *Swartz Syn. Fil.* (1806) 140.—Trunk 10–30 ft. high, seldom more, 9–18 in. diam. at the base, clothed above the middle with the short light-brown bases of the old stipites. Fronds numerous, horizontally spreading, 6–12 ft. long, 2–4 ft. broad, 2–3-pinnate, subcoriaceous, green or yellow-green above, pure-white beneath from a coating of deciduous powder. Stipes rather slender, slightly asperous, clothed at the base with shining dark-brown linear scales, elsewhere (together with the rhachis and costae) more or less covered with yellow-brown deciduous tomentum, becoming almost glabrous when old. Primary pinnae 1–1½ ft. long, oblong, acuminate; secondary, 2–4 in., linear-lanceolate, acuminate or almost caudate, deeply pinnatifid or pinnate towards the base. Segments or pinnules ¼–½ in. long, linear-oblong, acute or subacute, more or less falcate, serrate. Sori small, globose, copious, but often confined to the lower half of the segments. Indusium small, membranous, only covering the sorus in a very early stage, persistent at the base as a shallow cup.—*A. Rich. Fl. Nouv. Zel.* (1832) 77, t. 10. *A. Cunn. Precur.* (1836) n. 226; *Raoul Choix* (1846) 38; *Hook. Sp. Fil.* i (1846) 27; *Hook. f. Fl. Nov. Zel.* ii (1855) 7; *Handb. N.Z. Fl.* (1864) 349; *Hook. and Bak. Syn. Fil.* (1873) 26; *Thoms. N.Z. Ferns* (1882) 28; *Field N.Z. Ferns* (1890) 45; *Cheesem. Man. N.Z. Fl.* (1906) 948. (?) Hemitelia falcifolia *Col. Trans. N.Z. Inst.* xxiv (1892) 394. Polypodium dealbatum *Forst. f. Prodr.* (1786) n. 454.

North and South Islands, Chatham Islands: Abundant in woods from the North Cape to Foveaux Strait. Sea-level to 2500 ft *Ponga; Silver Tree-fern.*

Perhaps the most generally distributed of the New Zealand tree-ferns. It can usually be identified at a glance by the milk-white under-surface of the fronds, although individual specimens are occasionally seen in which the under-surface is obscurely glaucous or even quite green. Very young plants are always green beneath; the white first appearing in irregular patches, giving the under-surface a curious piebald appearance. Outside New Zealand it occurs in Lord Howe Island, and a barren plant collected at Penang is assumed to be the same.

2. **C. medullaris** *Swartz Syn. Fil.* (1806) 140.—Trunk 20–50 ft. high or even more, in old plants furnished at the base with a hard and thick conical buttress formed of densely compacted aerial rootlets, sometimes extending for several feet up the trunk, and 1–2½ ft. diam. at the foot; trunk proper rather slender for its height, black, marked with the hexagonal scars of the old stipites, and at the very top rough with the remains of the stipites. Fronds numerous, 20–30, curving, 8–20 ft. long, 3–5 ft. broad, 2–3-pinnate, coriaceous, dark-green above, paler beneath. Stipes stout, clothed at the base with copious black linear scales, and together with the rhachis more or less covered with scattered tubercles. Primary pinnae 1½–3 ft. long, oblong-lanceolate, acuminate; secondary 4–6 in. long, ¾–1½ in. broad, linear-lanceolate to linear-oblong, acuminate, pinnate below, pinnatifid above, costae more or less clothed with tawny silky hairs or glabrous. Pinnules or segments about ½ in. long, $\frac{1}{10}$–⅛ in. broad, linear or linear-oblong, obtuse, falcate; the fertile ones deeply crenate-serrate or lobulate, sometimes pinnatifid; the barren ones broader, crenate-serrate or almost entire; costules usually with pale ciliated scales beneath. Sori very numerous, one to each lobe of the pinnule. Indusium brown, membranous, splitting into 2–4 irregular lobes.—*A. Rich. Fl. Nouv. Zel.* (1832) 78; *A. Cunn. Precur.* (1836) n. 227; *Raoul Choix* (1846) 38; *Hook. Sp. Fil.* i (1846) 26; *Hook. f. Fl. Nov. Zel.* ii (1855) 7; *Handb. N.Z. Fl.* (1864) 349; *Hook. and Bak. Syn. Fil.* (1873) 25; *Thoms. N.Z. Ferns* (1882) 28; *Field N.Z. Ferns* (1890) 42, t. 9, f. 3; *Cheesem. Man. N.Z. Fl.* (1906) 948.

C. polyneuron *Col. in Trans. N.Z. Inst.* xi (1879) 429. Polypodium medullare *Forst f. Prodr.* (1786) n. 452; *Pl. Escul.* (1786) 74.

North and South Islands, Stewart Island, Chatham Islands: From the Three Kings Islands and the North Cape southwards, abundant, except in the east of Canterbury, Otago, and Stewart Island. Sea-level to 2000 ft. *Korau; Mamaku; Black Tree-fern.*

Apparently the same species occurs in south-east Australia, Tasmania, and in several of the Pacific islands. Colenso's *C. polyneuron*, separated by him chiefly on account of the more numerous veinlets, hardly seems to be entitled to the rank of a variety. The mucilaginous pith of the trunk and lower part of the stipes was formerly baked and eaten by the Maoris, and was considered to be an excellent article of food.

3. **C. Kermadecensis** *Oliver in Trans. N.Z. Inst.* xlii (1910) 158, t. 22. —Trunk tall, slender, 20–50 ft. high or more, furnished at the base with a conical buttress of densely compacted aerial rootlets. Fronds numerous, 8–20 ft. long, 3–4 ft. broad, 2–3-pinnate, subcoriaceous or almost membranous, dull-green above, paler beneath. Stipes slender, clothed at the base with copious linear brown scales, and with the rhachides and costae deeply grooved above. Primary pinnae 15–25 in. long, oblong-lanceolate, acute or acuminate; secondary 3–5 in. long, ½–1 in. broad, linear-oblong, acuminate, pinnate below, pinnatifid above; costae densely clothed with tawny silky hairs intermixed with linear scales; under-surfaces only slightly asperous. Segments ¼–⅓ in. long, linear or linear-oblong, obtuse or subacute. Sori numerous, moderately large, situated at the base of the lobes near the costules. Indusium membranous, persistent, splitting irregularly. —C. Milnei *Cheesem. Man. N.Z. Fl.* (1906) 949, *in part, not of Hook.*

Kermadec Islands: Sunday Island, abundant from sea-level to the tops of the highest hills, alt. 1700 ft., *T. F. C., W. R. B. Oliver!*

This is a noble species, said to occasionally reach the height of 70 ft. During my hurried visit to Sunday Island in 1887 I confounded it with *C. Milnei*, from which it differs in its much greater height, more slender and cleaner trunk, thinner and less coriaceous fronds which have the under-surface of the stipes and rhachis much more asperous, and in the long attenuated pinnae.

4. **C. Milnei** *Hook. ex Hook. f. Handb. N.Z. Fl.* (1864) 349.—Trunk 8–12 ft. high, short, stout, rough with the persistent bases of the old stipes, and at the top often clothed with the pendent withered fronds. Fronds numerous, horizontally spreading, 8–15 ft. long, 2–3 ft. broad, coriaceous, upper surface firm and shining, dark-green, paler beneath. Stipes stout, clothed at the base with copious linear brown scales, under-parts, together with the rhachis, furnished with closely placed hard tubercles. Primary pinnae 14–20 in. long, oblong-lanceolate, sharply acuminate; secondary pinnae 4–6 in. long, ½–1 in. broad, linear-oblong, drawn out into long acuminate points, pinnate below, pinnatifid above, costae clothed on both surfaces with tawny scales. Segments ¼–⅓ in. long, linear, falcate, acute, more or less serrate. Sori copious, nearer the costules than the margin. Indusium membranous, persistent, splitting irregularly. —*Cheesem. Man. N.Z. Fl.* (1906) 949; *Hook. and Bak. Syn. Fil.* (1873) 26; *Oliver in Trans. N.Z. Inst.* xlii (1910) 157, t. 21.

Kermadec Islands: Sunday Island, not so common as *C. Kermadecensis*, *T. F. C., W. R. B. Oliver!*

5. **C. Cunninghamii** *Hook. f. in Hook. Ic. Plant.* (1854) t. 985.—Trunk 8–20 ft. high, rarely more, often coated at the base with densely compacted aerial rootlets, upper part covered with the pendent withered fronds.

Fronds numerous, 20–30, 6–10 ft. long, 2–4 ft. broad, 2–3-pinnate, subcoriaceous or almost membranous, flaccid, dark-green above, paler beneath. Stipes rather slender, dark-coloured at the very base, and furnished with numerous linear scales, elsewhere pale, and together with the rhachis slightly tubercled, more or less covered, especially on the upper surface, with pale yellowish-brown woolly or strigose tomentum. Primary pinnae 1–2 ft. long, 4–6 in. broad, oblong-lanceolate, acuminate; secondary 2–4 in. long, about ¾ in. broad, linear-oblong, acuminate, deeply pinnatifid above, pinnate below. Segments or pinnules ⅓–½ in. long, linear, obtuse, regularly lobulate or pinnatifid; lobules entire; veins forked. Sori copious, one to each lobe of the pinnule, rather nearer the costa than the margin. Indusium brown, membranous, at first covering the sorus, splitting up very irregularly, sometimes leaving an unequal-sided cup with lacerate edges, at other times a single lobe on one side as in *Hemitelia.*—*Hook. f. Fl. Nov. Zel.* ii (1855) 7; *Handb. N.Z. Fl.* (1864) 350; *Hook. and Bak. Syn. Fil.* (1873) 25; *Thoms. N.Z. Ferns* (1882) 29; *Field N.Z. Ferns* (1890) 44, t. 9, f. 1, 2; *Cheesem. Man. N.Z. Fl.* (1906) 950.

North Island: Auckland—Mongonui County, *H. Carse!* Bay of Islands, *Cunningham, Miss Clarke!* Whangarei, *T. F. C.;* Great Barrier Island, *T. Kirk;* Waitakerei and Hunua, *T. F. C.* Wellington—Hutt Valley, *Ralph, Buchanan.* South Island: Nelson—Bateman's Gully, *D. Grant!* Motupiko, *H. H. Allan!* Westland—Wilberg Range, *Cockayne.* Canterbury—Mount Peal, *H. H. Allan!* Chatham Islands: *H. H. Travers! Miss Seddon!* Sea-level to 1500 ft.

Best distinguished from *C. medullaris*, to which it is closely allied, by the smaller size, more membranous fronds, paler and much less muricate stipes and rhachis, which are more or less clothed with yellowish strigose hairs, and by the smaller segments and sori.

6. **HEMITELIA** R. Br.

Tree-ferns, not distinguishable in habit from *Cyathea.* Fronds large, usually 2–3-pinnate, rarely pinnate. Stipes smooth or asperous or muricate. Veins pinnately forked; veinlets free, or the lower ones more or less anastomosing just above the costa. Sori dorsal, globose, situated upon a vein or veinlet; receptacle elevated, globose or elongated. Indusium never covering the sorus, very variable in size and shape, usually a half cup-shaped or semicircular scale on the lower side of the sorus, sometimes small and indistinct, often deciduous. Sporangia numerous, sessile or nearly so, bursting transversely; ring somewhat oblique, complete.

A tropical or subtropical genus, containing about 50 species, 30 of which are natives of America, the remainder scattered through the warm regions of the Old World. It only differs from *Cyathea* in the small one-sided involucre, and several species might be referred to either genus. The single species found in New Zealand is endemic.

1. **H. Smithii** *Hook. ex Hook. and Bak. Syn. Fil.* (1873) 31.—Trunk 6–25 ft. high, about 9 in. diam., coated with fibrous aerial rootlets below, clothed towards the top with the pendulous withered rhachides of the old fronds. Fronds numerous, horizontally spreading, 5–9 ft. long, bipinnate, lanceolate or oblong-lanceolate, acute but hardly acuminate, thin and membranous, bright fresh-green. Stipes slender, clothed at the base with a dense brush of long shining chestnut-brown subulate-lanceolate scales, slightly asperous beneath; rhachis pale yellow-green, almost glabrous when old, when young clothed with strigillose hairs above, and with lax deciduous scales beneath. Primary pinnae 9–15 in. long, 3–4 in. broad, linear-oblong, acuminate;

costae clothed with strigillose hairs above, paleaceous or glabrous beneath; secondary pinnae 1½–2½ in. long, pinnatifid above, pinnate at the base. Segments linear-oblong, acute, slightly falcate, coarsely serrate. Sori copious, on the fork of the veins. Indusium hemispherical, on the costal side of the sorus, variable in size, sometimes almost wrapping round the sorus at the base.—*Thoms. N.Z. Ferns* (1882) 29; *Field N.Z. Ferns* (1890) 46, t. 9. f. 5; *Cheesem. Man. N.Z. Fl.* (1906) 951. Cyathea Smithii *Hook. f. Fl. Nov. Zel.* ii (1855) 8, t. 72; *Handb. N.Z. Fl.* (1864) 350. C. stellulata *Col. in Trans. N.Z. Inst.* xviii (1886) 222.

Var. **microphylla** *Cheesem.*—Fronds fewer in number, soft, delicately membranous, pale grass-green; rhachis densely strigillose above, paleaceous beneath. Primary pinnae rather narrower and more acuminate. Segments smaller, entire or bluntly crenulate towards the tip.—H. microphylla *Col. in Trans. N.Z. Inst.* xxvii (1895) 399.

North and South Islands, Stewart Island: Abundant in damp hilly forests from Kaitaia (Mongonui County) southwards. Sea-level to 2000 ft. Auckland Islands: Norman Inlet, rare, *W. Joss ex Cockayne!*

A very beautiful species, with the most tender fronds of any New Zealand tree-fern. The trunk is not uncommonly forked or branched above; and Mr. Buchanan (Trans. N.Z. Inst. xix (1887) 217) describes and figures a remarkable specimen which had no less than 16 well-developed branches. *H. Smithii* and *Dicksonia squarrosa* are plentiful through the whole of the lowland districts of Stewart Island, in S. lat. 47° 20′, and the former species has recently been found in the Auckland Islands (S. lat. 50° 40′), the extreme southern limit of arborescent ferns.

7. **ALSOPHILA** R. Br.

Usually tree-ferns, but in some species the trunk is short or absent. Fronds large, 2–3-pinnate, very similar to those of *Cyathea* or *Hemitelia*. Veins of the segments forked or pinnately divided. Sori dorsal, globose, situated upon a vein or at the fork of a vein; receptacle more or less elevated, pilose. Indusium altogether wanting. Sporangia numerous, sessile or nearly so, often mixed with hairs, bursting transversely; ring somewhat oblique, complete.

Species about 175, mostly tropical, nearly half of them from America, the remainder scattered through tropical Asia, Malaya, and the Pacific islands, with a few in Africa. The single New Zealand species is endemic.

1. **A. Colensoi** *Hook. f. Fl. Nov. Zel.* ii, 8, t. 73.—Caudex long, prostrate and rooting, seldom more than 6–8 in. in circumference, rarely erect or ascending at the tip and attaining a height of 3–5 ft. Fronds 2–5 ft. long, ¾–2 ft. broad, 2–3-pinnate, broadly ovate-lanceolate, acute, membranous, yellowish-green or reddish-brown. Stipes short, densely covered at the base with pale subulate scales 1 in. long, upper portion, together with the rhachis and costae, more or less thickly clothed with fulvous or reddish-brown hairs intermixed (especially on the under-surface) with pale tumid scales. Primary pinnae 9–15 in. long, 2–3½ in. broad, oblong-lanceolate, acuminate; secondary 1½–2 in. long, about ½ in. broad, pinnatifid above, pinnate at the base. Segments oblong, obtuse, obtusely serrate; veins simple. Sori copious, situated on the middle of the veins.—*Handb. N.Z. Fl.* (1864) 350; *Hook. and Bak. Syn. Fil.* (1873) 40; *Thoms. N.Z. Ferns* (1882) 30; *Field N.Z. Ferns* (1890) 48, t. 3, f. 4; *Cheesem. Man. N.Z. Fl.* (1906) 952.

North Island: Mountains of the interior, from Hikurangi and Mount Egmont southwards. South Island: Not uncommon in hilly and subalpine forests throughout. Stewart Island: Mount Anglem, *T. Kirk!* base of Table Hill and Thomson Range,

Cockayne. Usually between 2000 and 4000 ft., but descends to low levels in the south of Otago.

For some interesting remarks on the mode of growth of this species, see Mr. Field's "New Zealand Ferns," quoted above; also a paper by the same author in the "Journal of Botany" for 1878, p. 365.

8. **CYSTOPTERIS** Bernh.

Small membranous and flaccid ferns. Rhizome very short, creeping. Fronds tufted, 2–3-pinnatifid. Veins pinnate and forked; veinlets free, not anastomosing, terminating a little within the margin. Sori small, globose, dorsal, placed at a distance from the margin on the back of a vein. Indusium ovate-deltoid, membranous, jagged, free at the sides, inserted by a broad base under the sorus, and at first bent over it like a hood; ultimately reflexed. Sporangia numerous, stalked, girt by an incomplete vertical ring, bursting transversely.

A small genus of 8 species, found in cool damp mountainous situations in the temperate regions of both hemispheres. The single New Zealand species has the range of the genus.

1. **C. fragilis** *Bernh. in Schrad. Neu. Journ. Bot.* ii (1806) 27, t. 2, f. 9.—Rhizome short, suberect, often branched near the top, clothed with red-brown lanceolate scales. Stipes 1–4 in. long, slender, fragile, stramineous, slightly scaly at the base. Fronds 3–9 in. long, 1–2 in. broad, oblong-lanceolate or ovate-lanceolate, thin and membranous, pale-green, pinnate or 2-pinnate; rhachis smooth, naked, slightly winged above. Primary pinnae rarely more than 1 in. long and usually much less, remote, spreading, lanceolate to ovate, toothed or pinnatifid or again pinnate; pinules oblong, usually deeply toothed or incised. Sori 3–12 to a pinnule, medial on the veins. Indusium very delicate, at first covering the sorus, but soon reflexed and often disappearing in age.—*Hook. Sp. Fil.* i (1846) 197; *Hook. f. Fl. Tasm.* ii (1860) 136, t. 166; *Handb. N.Z. Fl.* (1864) 358; *Hook. and Bak. Syn. Fil.* (1873) 103; *Benth. Fl. Austral.* vii (1878) 752; *Thoms. N.Z. Ferns* (1882) 50; *Field N.Z. Ferns* (1890) 76, t. 18, f. 5, 5A; *Cheesem. Man. N.Z. Fl.* (1906) 957. C. tasmanica *Hook. Sp. Fil.* i (1846) 199; *Ic. Plant.* t. 959. C. novae-zelandiae *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 360. (?) C. laciniatus *Col. in Trans. N.Z. Inst.* xxi (1899) 265.

North Island: Mount Egmont, *Mrs. Jones, T. F. C.;* Tararua Ranges, *Buchanan;* Wairarapa Valley, *H. C. Field.* South Island: Not uncommon in mountain districts throughout. Usually from 1000 to 4000 ft., but descends almost to sea-level in several localities in the South Island.

Almost universally distributed in the North and South Temperate Zones and on the higher mountains of the tropics, and everywhere extremely variable. The New Zealand plant differs from the type in its slightly smaller size and more tender and delicate habit. It was constituted a separate species by Mr. J. B. Armstrong, and a very similar if not identical plant-form from Tasmania was also separated by Sir W. J. Hooker, but afterwards abandoned. After comparing these with a lengthy series of European and North American specimens of *C. fragilis*, I find that the differences are so uncertain and trifling as to dissipate any idea of maintaining the New Zealand plant as distinct.

9. **POLYSTICHUM** Roth.

Rhizome short or erect or ascending, or long and creeping. Fronds tufted at the top of the rhizome, or more or less distant along it, variable in size and cutting, coriaceous, veins free. Sori globose, dorsal, placed

on the back or at the tip of a vein, or at the junction of two veins. Indusium orbicular, attached by a central stalk, flat or convex, membranous, concealing the sorus when young. Sporangia stalked, bursting transversely, girt by an incomplete vertical ring.

A genus of about 100 species, found in most parts of the world. It is easily recognized by the free veins, stiff and coriaceous habit, and usually sharply toothed segments. Of the 8 species found in New Zealand, 3 are endemic, 2 do not extend further than Victoria or Fiji, 1 is abundant throughout the cooler parts of the South Temperate Zone; the remaining 2 are widely spread through the warmer parts of the Southern Hemisphere.

A. Rhizome short, stout, erect. Fronds tufted at the top of the rhizome.

Fronds 1–3 ft.; narrowed below, 2-pinnate; segments sharply toothed. Stipes shaggy with large dark scales mixed with hairs .. .. 1. *P. vestitum.*
Fronds 12–18 in., 2-pinnate; segments narrower and more distant than in the preceding; texture thinner .. .. 2. *P. sylvaticum.*
Fronds 9–18 in., ovate-deltoid, rigid, not narrowed below; segments sharply toothed. Stipes with narrow black scales .. 3. *P. Richardi.*
Fronds 10–20 in., ovate-oblong, not narrowed below, 2–3-pinnate; segments obtusely toothed. Stipes with large black scales margined with white. Indusium with a large black disc .. 4. *P. oculatum.*
Fronds 4–12 in., oblong-lanceolate, soft and almost flaccid, 2-pinnate. Stipes with large pale membranous scales. Indusium large, very convex .. .. 5. *P. cystostegia.*

B. Rhizome long, creeping. Fronds distant along the rhizome.

Fronds 1–2 ft., ovate-deltoid, finely 2–4-pinnate. Stipes and rhachis densely hispid with rigid linear bristles .. .. 6. *P. hispidum.*
Fronds 1–3 ft., deltoid, 2–3-pinnate; ultimate segments obtusely lobed or toothed .. .. 7. *P. adiantiforme.*
Fronds 1–3 ft., deltoid, 2–3-pinnate; ultimate segments with aristate teeth or lobes .. .. 8. *P. aristatum.*

[I have omitted from the enumeration *P. mohrioides* Presl, the existence of which in the New Zealand area depends entirely on Mr. Kirk's record in Trans. N.Z. Inst. xiv, 386. There are no specimens in his herbarium, and I fear that some mistake was made in the identification.]

1. **P. vestitum** *Presl Tent. Pterid.* (1836) 83.—Rhizome short, stout, erect or ascending, sometimes produced into an erect caudex 1–4 ft. high. Stipes 6–18 in. long, stout, erect, densely clothed with spreading scales; many of the scales large, over 1 in. long, ovate-lanceolate or subulate-lanceolate, long-acuminate, lacerate, straight or curved, glossy, black or dark-brown with a pale margin; others bristle-like or woolly, pale-ferruginous or tawny. Fronds numerous, forming a spreading crown at the top of the caudex, 1–3 ft. long without the stipes, 4–9 in. broad, oblong-lanceolate or linear-oblong, acute or acuminate, narrowed towards the base, rather coriaceous, dark-green, glabrous above when mature, under-surface more or less fibrillose, bipinnate; rhachis usually densely scaly like the stipes, but sometimes the broader scales are wanting. Primary pinnae numerous, close-set, horizontally spreading, 2–5 in. long, ½–1 in. broad, linear-lanceolate or lanceolate, acuminate. Pinnules numerous, close, shortly stipitate, ovate-rhomboidal, unequal-sided, more or less auricled on the upper side near the base, toothed or lobed or pinnatifid, the lobes acute or pungent. Sori 6–8 to a pinnule, in 2 rows nearer the midrib than the margin. Indusium rather small, flat, orbicular.—*Hook. f. Fl. Nov. Zel.* ii (1855) 38; *Homb. et Jacq. Voy. au Pôle Sud* (1853) *Crypt.* t. 4, f. s. P. venustum *Homb. et Jacq. l.c.* t. 5, f. x; *Hook. f. Fl. Antarct.*

Polystichum mohrioides (Bory) Presl.
Kapiti & Auckland Islands.
See Allan Trans: Vol 65 p. 23.

i (1844) 106. Aspidium aculeatum *var.* vestitum *Hook. f. Handb. N.Z. Fl.* (1864) 375; *Hook. Sp. Fil.* iv (1862) 22; *Hook. and Bak. Syn. Fil.* (1873) 252; *Thoms. N.Z. Ferns* (1882) 78; *Field N.Z. Ferns* (1890) 126, t. 8, f. 2; *Cheesem. Man. N.Z. Fl.* (1906) 997. Aspidium vestitum *Swartz Syn. Fil.* (1806) 53; *A. Rich. Fl. Nouv. Zel.* (1832) 68; *A. Cunn. Precur.* (1836) n. 218; *Raoul Choix* (1846) 38. A. pulcherrimum *and* A. Waikarense *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 161. A. perelegans *and* A. zerophyllum *Col. in Trans. N.Z. Inst.* xxix (1897) 416, 418.

North and South Islands, Chatham Islands, Stewart Island, Auckland and Campbell Islands, Antipodes Island, Macquarie Island: Rather local from Cape Colville to the East Cape, not uncommon in hilly districts from thence to Wellington, abundant to the south of Cook Strait. Sea-level to 3500 ft.

Polystichum vestitum is mainly distinguished from the widespread *P. aculeatum* by the copious dark-coloured scales, which usually clothe not only the stipes but also the rhachis up to its tip. It is also found in Australia, Tasmania, and Fuegia, and varies greatly in the size, shape, and texture of the frond, in the shape of the pinnules, and the extent to which they are toothed or lobed, and in many other respects.

2. **P. sylvaticum** *Diels in Pflanzenf.* Teil i, abt. iv (1902) 192.—Rhizome short, erect or ascending. Stipes 4–8 in. long, slender, more or less densely clothed with ovate-lanceolate chestnut or dark ferruginous scales usually mixed with linear-subulate ones. Fronds not very numerous, 1–2 ft. long, 3–6 in. broad, lanceolate, acuminate, gradually tapering to the base, firm but scarcely coriaceous, 2-pinnate. Primary pinnae rather distant, opposite below, alternate above, lanceolate or linear-lanceolate, acuminate, 2–4 in. long, $\frac{1}{2}$–$\frac{3}{4}$ in. wide. Pinnules numerous, $\frac{1}{3}$–$\frac{1}{2}$ in. long, ovate-lanceolate, unequal-sided at the base, pinnatifid about half-way down into 5–8 acute spinulose lobes. Sori usually as many as the lobes. Indusium not developed.—Polypodium sylvaticum *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 163; *Hook. f. Fl. Nov. Zel.* ii (1855) 41, t. 81; *Handb. N.Z. Fl.* (1866) 380; *Hook. Sp. Fil.* iv (1862) 249. Polystichum aculeatum *var.* sylvaticum *Cheesem. Man. N.Z. Fl.* (1906) 998.

North and South Islands: From Coromandel and the Thames goldfields to the south of Otago, but not common. 500–3500 ft.

Although closely allied to *P. vestitum* this appears to me to differ in its smaller size and more slender habit, fewer fronds which have a much thinner texture, more distant pinnae, and in the invariable absence of the indusium.

3. **P. Richardi** *J. Smith Hist. Fil.* (1875) 220.—Rhizome short, thick, densely clothed with linear-subulate dark-brown or blackish scales. Stipes 6–18 in. long, stout, erect, more or less clothed with rigid black subulate deciduous scales mixed with woolly hairs. Fronds few, tufted at the top of the rhizome, 9–18 in. long or more without the stipes, 3–9 in. broad, ovate-deltoid to lanceolate-deltoid, acuminate, not narrowed at the base, rigid and coriaceous, glabrous above, more or less woolly or furfuraceous beneath, pinnate or 2-pinnate; rhachis often scaly and woolly like the stipes, but usually less conspicuously so. Pinnae numerous, usually close and compact, but sometimes a little remote, spreading, $\frac{1}{2}$–4 in. long, $\frac{3}{4}$–$1\frac{1}{2}$ in. broad, lanceolate or ovate-lanceolate, deeply pinnatifid or again pinnate. Pinnules numerous, close, lanceolate or ovate-lanceolate or ovate-oblong, acute or mucronate or pungent, usually more or less acutely serrate, but sometimes the teeth are obtuse or very obscure. Sori in two rows in each pinnule, about half-way between the midrib and the margin.

Indusium orbicular, flat, with a rather large dark disc and pale margin.—P. aristatum *Hook. f. Fl. Nov. Zel.* ii (1855) 37, t. 78 (*not of Presl*). Aspidium Richardi *Hook. Sp. Fil.* iv (1862) 23, t. 222; *Hook. f. Handb. N.Z. Fl.* (1864) 375; *Hook. and Bak. Syn. Fil.* (1873) 253; *Thoms. N.Z. Ferns* (1882) 79; *Field N.Z. Ferns* (1890) 128, t. 13, f. 4; *Cheesem. Man. N.Z. Fl.* (1906) 999. Aspidium acutidentatum *A. Rich. Fl. Nouv. Zel.* (1832) 71.

North and South Islands: From the North Cape to the south of Otago, not uncommon in lowland districts, especially near the sea.

Also in Fiji. A variable plant, especially in the extent to which the pinnae are divided, and in the shape and toothing of the pinnules.

4. **P. oculatum** *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 364.—"Rhizome absent. Fronds 10–20 in. long, coriaceous, ovate-oblong, acuminate, 3-pinnate, pale and clothed with woolly hairs below; stipes stout, straw-coloured, covered with rigid, large, subulate, brown scales margined with white; rhachis with fewer softer scales and lax woolly hairs; primary divisions of the frond 2–4 in. long, narrow ovate-lanceolate, acuminate, stalked, not close together; secondary also lax, ⅔–1 in. long, sessile or stalked; pinnules alternate, sessile, decurrent, ¼ in. long, obtuse or mucronate, obtusely toothed or subpinnatifid. Sori abundant over the whole under-surface, 2–4 on each segment; involucre orbicular, shortly stalked, with a large black disc and narrow reddish margin."—Aspidium oculatum *Hook. Sp. Fil.* iv (1862) 24, t. 228; *Hook. f. Handb. N.Z. Fl.* (1864) 376; *Hook. and Bak. Syn. Fil.* (1873) 253; *Thoms. N.Z. Ferns* (1882) 79; *Field N.Z. Ferns* (1890) 129; *Cheesem. Man. N.Z. Fl.* (1906) 999.

North and South Islands: "Wairarapa Valley, *Colenso;* Akaroa, *Raoul*" (Handbook).

I have not identified this with certainty, and have consequently reproduced the description given in the Handbook. It is probably nothing more that a trivial variety of *P. Richardi* with a rather laxer frond than usual, and smaller and shorter pinnules with more obtuse teeth. Mr. Baker keeps it as a distinct species in the "Synopsis Filicum," but in the "Annals of Botany" (v, 314) he remarks that it is evidently a mere variety of *P. Richardi.*

5. **P. cystostegia** *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 364.—Rhizome short, stout, densely scaly, sometimes branched above. Stipes 2–6 in. high, pale-brown, clothed with copious large pale-brown shining membranous lanceolate scales. Fronds very numerous, tufted at the top of the rhizome, 4–10 in. long without the stipes, 1½–2 in. broad, oblong-lanceolate, acute, pale-green, soft, membranous and almost flaccid, both surfaces clothed with linear scales when young, 2-pinnate; rhachis stout, densely scaly. Pinnae spreading, closely placed above the middle, remote below, ½–1½ in. long, ovate-deltoid, pinnate; rhachises often winged. Pinnules ¼–⅓ in. long, ovate-lanceolate, deeply lobed or pinnatifid; segments obtuse or acute. Sori numerous, large, 2–4 to a pinnule. Indusium orbicular, very convex, almost hemispherical, thin and membranous, pale-coloured.—Aspidium cystostegia *Hook. Sp. Fil.* iv (1862) 26, t. 227; *Hook. f. Handb. N.Z. Fl.* (1864) 376; *Hook. and Bak. Syn. Fil.* (1873) 253; *Thoms. N.Z. Ferns* (1882) 79; *Field N.Z. Ferns* (1890) 128, t. 8, f. 3; *Cheesem. Man. N.Z. Fl.* (1906) 1000; *Ill. N.Z. Fl.* ii (1914) t. 244.

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NORTH ISLAND : Tongariro, *Dieffenbach ;* Mount Egmont, *Mrs. Jones, T. F. C. ;* Tararua Mountains, *Buchanan.* SOUTH ISLAND : Not uncommon in alpine districts throughout. STEWART ISLAND : Mount Anglem, *Cockayne.* AUCKLAND ISLANDS : *T. Kirk.* 3000–5500 ft.

A very distinct little species, easily recognized by the stout soft stipes and rhachis densely clothed with large pale scales, the narrow frond, and large bladdery indusia. A form with a firmer frond and dark-coloured scales on the stipes is occasionally seen.

6. **P. hispidum** *J. Smith in Journ. Bot.* iv (1841) 195.—Rhizome long, stout, creeping, densely clothed with subulate red-brown scales. Stipes 9–18 in. long, stout, erect, brown, everywhere hispid with long rigid linear spreading bristles with a swollen base. Fronds 9–18 in. long or more, 6–12 in. broad, broadly ovate or triangular, acuminate, brownish-green, coriaceous, 3–4-pinnate ; primary and secondary rhachises bristly like the stipes. Primary pinnae 3–8 in. long, ovate-lanceolate or the lowest deltoid, acuminate, the lowest pinnule larger than the others. Secondary pinnae oblong-lanceolate, again 1- or 2-pinnate. Pinnules $\frac{1}{4}$–$\frac{1}{2}$ in. long, narrow-lanceolate, acute, deeply and acutely toothed or almost pinnatifid, the teeth often pungent. Sori large, copious, one to each of the ultimate segments or lobes. Indusium orbicular with an indistinct sinus, flat, brown.—Aspidium hispidum *Swartz Syn. Fil* (1806) 56 ; *A. Rich. Fl. Nouv. Zel.* (1832) 69 ; *A. Cunn. Precur.* (1836) n. 221 ; *Raoul Choix* (1846) 38. Nephrodium hispidum *Hook. Sp. Fil.* iv (1862) 150 ; *Hook. f. Handb. N.Z. Fl.* (1864) 378 ; *Hook. and Bak. Syn. Fil.* (1873) 286 ; *Benth. Fl. Austral.* vii (1878) 760 ; *Thoms. N.Z. Ferns* (1882) 83 ; *Field N.Z. Ferns* (1890) 132, t. 3, f. 3 ; *Cheesem. Man. N.Z. Fl.* (1906) 1004 ; *Ill. N.Z. Fl.* ii (1914) t. 245.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS : Abundant in forests throughout. Sea-level to 2000 ft.

A very distinct species, at once recognized by the finely divided frond and the numerous stiff spreading bristles on the stipes and rhachis. It is also found in Victoria, where, however, it is rare and local.

7. **P. adiantiforme** *J. Smith Hist. Fil.* (1875) 220.—Rhizome long, stout, creeping, covered with large tawny subulate-lanceolate silky scales. Stipes 1–2 ft. long, stout, erect, more or less densely clothed with deciduous scales. Fronds scattered along the rhizome, 9–18 in. long without the stipes, 6–12 in. broad, ovate-deltoid, acuminate, very coriaceous, rigid, glabrous or the under-surface slightly paleaceous, 3-pinnate ; rhachis deciduously scaly. Primary pinnae erecto-patent, stipitate, lanceolate or lanceolate-deltoid, 2-pinnate ; the lowest pair the largest, 4–8 in. long, 2–3 in. broad, the basal secondary pinna on each side of the frond longer than the others. Ultimate segments oblong, obtuse or subacute, shortly and bluntly lobed or almost entire, not mucronate. Sori copious, in 2 rows near the midrib, often covering the whole under-surface. Indusium large, orbicular, sometimes with a distinct sinus.—Aspidium capense *Willd. Sp. Plant.* v (1810) 267 ; *Hook. and Bak. Syn. Fil.* (1873) 254 ; *Benth. Fl. Austral.* vii (1878) 758 ; *Thoms. N.Z. Ferns* (1882) 80 ; *Field N.Z. Ferns* (1890) 129, t. 6, f. 2 ; *Cheesem. Man. N.Z. Fl.* (1906) 1000. Aspidium coriaceum *Swartz Syn. Fil.* (1806) 57 ; *A. Rich. Fl. Nouv. Zel.* (1832) 71 ; *A. Cunn. Precur.* (1836) n. 223 ; *Raoul Choix* (1846) 38 ; *Hook. Sp. Fil.* iv (1862) 32 ; *Hook. f. Handb. N.Z. Fl.* (1864) 376. Aspidium Cunninghamianum *Col. in Tasm. Jour. Nat. Sci.* ii (1846) 166. Polystichum coriaceum *Schott Gen. Fil.* ad t. 9 (1834) ; *Hook. f. Fl. Nov. Zel.* ii (1855) 37. Polypodium adiantiforme *Forst. f. Prodr.* (1786) n. 449.

North and South Islands, Stewart Island, Chatham Islands: Abundant in forests throughout, often climbing up trees. Sea-level to 2000 ft.

A widely distributed fern, found in temperate Australia, Polynesia, South Africa, Mauritius, and in America stretching from Cuba to Patagonia.

8. **P. aristatum** *Presl Tent. Pterid.* (1836) 83.—Rhizome long, stout, creeping, clothed with linear-subulate ferruginous scales. Stipes 9–18 in. long, stout, densely clothed towards the base with linear fibrillose scales. Fronds scattered, 1–2 ft. long by 9–12 in. broad, ovate-deltoid, acuminate, coriaceous, dark-green and glossy, both surfaces naked, 3-pinnate; rhachis glabrous or sparingly paleaceous. Primary pinnae stipitate, lanceolate, acuminate, pinnate or 2-pinnate; the lowest pair the longest, 6–9 in. long, lanceolate-deltoid, with an elongated basal pinnule. Pinnules obliquely ovate-lanceolate or narrow ovate-rhomboid, irregularly dentate with the teeth ending in bristle-like points. Sori rather small, in 2 rows near the midrib. Indusium smooth, flat, orbicular or rarely slightly reniform.—Polypodium aristatum *Forst. f. Prodr.* (1786) n. 448. Aspidium aristatum *Swartz Syn. Fil.* (1806) 53; *Hook. Sp. Fil.* iv (1862) 27; *Hook. f. Handb. N.Z. Fl.* (1864) 376; *Hook. and Bak. Syn. Fil.* (1873) 255; *Benth. Fl. Austral.* vii (1878) 757; *Thoms. N.Z. Ferns* (1882) 80; *Cheesem. Man. N.Z. Fl.* (1906) 1001.

Kermadec Islands: Sunday Island, abundant, *McGillivray, T. F. C., Oliver!*

A most abundant Polynesian plant, also found in tropical Australia, Malaya, India, China, Japan, and South Africa.

10. **DRYOPTERIS** Adanson.

Rhizome long and creeping, or short and tufted. Fronds crowded at the top of the rhizome or scattered along it, very various in size and form, frequently pinnate with the pinnae pinnatifid, or 2–3-pinnate or even decompound. Veins all free, or the lower veinlets in a lobe united by their tips to those of the adjoining lobes, or (in species not found in New Zealand) copiously anastomosing. Sori subglobose, dorsal, placed on the back or at the tip of a vein. Indusium usually conspicuous, but not infrequently feebly developed or even absent, cordate or reniform, attached by the sinus, membranous, often concealing the sorus when young. Sporangia stalked, surrounded by an incomplete vertical ring, bursting transversely.

The genus *Dryopteris*, which through priority of nomenclature now takes the place of *Nephrodium*, and which has been considerably enlarged by the inclusion of those species of *Polypodium* which only differ from *Nephrodium* in the absence of an indusium, now constitutes one of the largest genera of ferns. Of the 9 species found in New Zealand, 5 are widely distributed, 3 are found in Australia or Polynesia, and 1 is endemic.

Subgenus I. Lastrea. *Veins and veinlets all free. Indusium present.*

Rhizome long, creeping. Fronds 6–12 in. long without the stipes, membranous, glabrous except a few scales on the under-surface of the rhachis and costae .. .. 1. *D. Thelypteris.*

Rhizome long, creeping. Fronds 9–18 in. without the stipes, pale-green, finely pubescent. Stipes pubescent .. .. .. 2. *D. decomposita.*

Rhizome short, tufted. Fronds 6–14 in., dark-green, glabrous except the rhachis and costae. Stipes nearly glabrous .. .. 3. *D. glabella.*

Rhizome short, tufted. Fronds 9–18 in., reddish-brown, both surfaces clothed with short velvety pubescence .. .. .. 4. *D. velutina.*

Rhizome short. Fronds 1–3 ft., ovate or ovate-lanceolate, pale-green, membranous; rhachises and under-surfaces with fine spreading hairs .. .. 5. *D. setigera.*

Subgenus II. PHEGOPTERIS. *Veins all free. Indusium absent.*

Stipes continuous with the rhizome. Fronds large, 2–4-pinnate, glandular-pubescent .. .. 6. *D. punctata.*

Subgenus III. GONIOPTERIS. *Veins pinnate in the lobes, the lower veinlets uniting at the tips with those of the adjoining lobes. Indusium absent.*

Stipes continuous with the rhizome. Fronds large, 2–5 ft., pinnate, membranous, glabrous or nearly so .. .. 7. *D. pennigera.*

Subgenus IV. CYCLOSORUS. *Veins pinnate in the lobes, the lower veinlets uniting at the tips with those of the adjoining lobes. Indusium present.*

Rhizome short. Fronds 1–3 ft., soft and membranous, finely pilose; lower pinnae gradually reduced in size .. .. .. 8. *D. parasitica.*

Rhizome long, creeping. Fronds 6–18 in., rather rigid; lower pinnae not reduced in size .. .. 9. *D. gongylodes.*

1. **D. Thelypteris** *Asa Gray Man. Bot. U.S.A.* ed. 1 (1848) 630; var. **squamulosum** *Schlecht. Fil. Cap.* 23, t. 11.—Rhizome long, slender, creeping, branched. Stipes 4–12 in. long, slender, straw-coloured, darker at the base, smooth, naked or slightly scaly when young. Fronds scattered along the rhizome, 6–12 in. long without the stipes, rarely more, 2–5 in. broad, linear-oblong or lanceolate, acuminate, truncate at the base, pale-green, membranous, glabrous except the costae and rhachis which are sparsely clothed beneath with pale broad convex scales, pinnate. Pinnae opposite or nearly so, 1–2½ in. long, ⅓–½ in. broad, linear-oblong, deeply pinnatifid. Segments ⅙–¼ in. long, oblong, obtuse or subacute, quite entire, broader and flatter in the sterile frond than in the fertile. Veins free, the lower or nearly all forked. Sori numerous, small, in two rows, rather nearer the recurved margin than the midrib. Indusium cordate-reniform, glandular-ciliate.—Nephrodium Thelypteris *Hook. Sp. Fil.* iv (1863) 88. *Hook. f. Handb. N.Z. Fl.* (1864) 377; *Hook. and Bak. Syn. Fil.* (1873) 271; *Thoms. N.Z. Ferns* (1882) 81; *Field N.Z. Ferns* (1890) 130, t. 13, f. 3; *Cheesem. Man. N.Z. Fl.* (1906) 1002. N. squamulosum *Hook. f. Fl. Nov. Zel.* ii (1855) 39.

NORTH ISLAND: Marshes from the North Cape to the East Cape, Taupo, Wanganui, and Otaki, but often local. Sea-level to 2000 ft.

The typical form of the species is found in Europe, north Asia, the Himalayas, and North America; the var. *squamulosum*, which differs chiefly in the scales on the underside of the rhachis and costae, appears to be confined to New Zealand and South Africa.

2. **D. decomposita** *O. Kuntze Rev. Gen. Pl.* ii (1891) 812.—Rhizome long, slender, creeping, branched, more or less clothed with chaffy scales. Stipes 6–18 in. long, firm, erect, scaly towards the base, villous-pubescent above. Fronds scattered along the rhizome, not tufted, 9–18 in. long without the stipes, often almost as broad, ovate-deltoid or pentangular, acuminate, membranous or subcoriaceous, pale-green, more or less finely villous or pubescent, 2-pinnate above, 3-pinnate below; rhachis and costae slender, villous-pubescent: Primary pinnae 4–9 in. long; the lowest pair much the largest, unequally deltoid with the basal secondary pinna on each side much longer than the rest; upper pinnae gradually smaller, ovate-lanceolate. Secondary pinnae lanceolate, deeply pinnatifid or the lower again pinnate; ultimate segments close, unequal-sided, ovate-rhomboid to lanceolate-rhomboid, acutely toothed or lobed. Sori rather large, distant, nearer the margin than the midrib. Indusium orbicular-reniform.—Nephrodium decompositum *Hook. f. Fl. Nov. Zel.* ii (1855) 39, t. 79; *Handb. N.Z. Fl.* (1864) 378; *Hook. Sp. Fil.* iv (1862) 146; *Hook. and Bak. Syn. Fil.* (1873) 281; *Thoms.*

N.Z. Ferns (1882) 82; *Field N.Z. Ferns* (1890) 131, t. 5, f. 7; *Cheesem. Man. N.Z. Fl.* (1906) 1002. N. pentangularum *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 169. Aspidium decompositum *Spreng. Syst.* iv (1827) 109; *Benth. Fl. Austral.* vii (1878) 758.

Kermadec Islands, North and South Islands, Chatham Islands: Not uncommon in lowland districts, usually in rich alluvial soils. Sea-level to 1200 ft.

An abundant Australian plant, ranging from the north of Queensland to Tasmania, also in Norfolk Island.

3. **D. glabella** *C. Christen. Ind. Fil.* (1905) 267.—Rhizome short, stout, tufted, clothed with the bases of the old stipites intermixed with subulate scales. Stipes 4–10 in. long, slender, firm, scaly at the base, glabrous or nearly so above. Fronds tufted at the top of the rhizome, 6–14 in. long or more without the stipes, 4–10 in. broad, ovate-deltoid, acuminate, membranous but firm, dark-green, 2–3-pinnate; surfaces almost glabrous except the rhachis and costae, which are more or less clothed with short reddish pubescence. Primary pinnae 2–5 in. long; the lowest pair the largest, deltoid, not so unequal-sided as in *N. decompositum*, and the basal secondary pinnae not conspicuously longer than the rest; upper pinnae lanceolate, acuminate; secondary rhachises margined throughout. Secondary pinnae obliquely ovate-lanceolate or lanceolate, deeply pinnatifid or the lower again pinnate; ultimate segments ovate or oblong, sharply toothed or lobed. Sori distant, about half-way between the margin and the midrib. Indusium pale, orbicular-reniform.—Nephrodium glabellum *A. Cunn. Precur.* (1836) n. 224; *Raoul Choix* (1846) 38; *T. Kirk in Trans. N.Z. Inst.* x (1878) 398; *Thoms. N.Z. Ferns* (1882) 82; *Field N.Z. Ferns* (1890) 131, t. 6, f. 3; *Cheesem. Man. N.Z. Fl.* (1906) 1003. N. decompositum *var.* pubescens *Hook. f. Fl. Nov. Zel.* ii (1855) 39. N. decompositum *var.* microphyllum *Hook. Sp. Fil.* iv (1862) 146. N. decompositum *var.* glabellum *Hook. and Bak. Syn. Fil.* (1873) 281.

Kermadec Islands, North and South Islands: In dry woods from the North Cape to Foveaux Strait, not uncommon. Sea-level to 1500 ft.

Also in Australia and several of the Polynesian islands. Closely allied to *D. decomposita*, but sufficiently distinct in the short (not creeping) rhizome, the nearly glabrous stipes, the smaller dark-green and glossy tufted fronds, with a narrower outline, and with the surfaces glabrous except a reddish pubescence on the rhachis and costae.

4. **D. velutina** *O. Kuntze Rev. Gen. Pl.* ii (1891) 814.—Rhizome short, stout, erect. Stipes 9–18 in. long, firm, erect, densely villose-pubescent above, clothed at the base with large red-brown subulate scales. Fronds tufted at the top of the rhizome, 9–18 in. long, almost the same in breadth, broadly deltoid or pentangular, acuminate, reddish-brown, soft and membranous, clothed on both surfaces with copious short silky hairs, 2–3-pinnate or in large specimens 4-pinnate at the base; rhachises densely silky. Lower primary pinnae much the largest, 6–12 in. long, deltoid, the lowest secondary pinna much longer than the rest and deflexed; upper pinnae gradually smaller, oblong-deltoid to lanceolate-deltoid, acuminate. Secondary pinnae close, numerous, lanceolate, deeply pinnatifid or again pinnate. Pinnules oblong-ovate or oblong, obtuse, deeply obtusely lobed or pinnatifid. Sori rather small, copious; indusium pubescent, often glandular.—Nephrodium velutinum *Hook. f. Fl. Nov. Zel.* ii (1855) 39, t. 80; *Handb. N.Z. Fl.* (1864) 378; *Hook. Sp. Fil.* iii (1860) 145; *Hook. and Bak. Syn. Fil.* (1873) 281;

Thoms. N.Z. Ferns (1882) 83; *Field N.Z. Ferns* (1890) 132, t. 20, f. 2; *Cheesem. Man. N.Z. Fl.* (1906) 1004. Aspidium velutinum *A. Rich. Fl. Nouv. Zel.* (1832) 70; *A. Cunn. Precur.* (1836) n. 222; *Raoul Choix* (1846) 38.

North and South Islands: Dry woods from the North Cape to Otago, but rather local in the South Island. Sea-level to 1000 ft.

Allied to *N. decomposita*, but easily separated by the more membranous and flaccid reddish-brown fronds, densely clothed with a short velvety pubescence. Apparently confined to New Zealand.

5. **D. setigera** *O. Kuntze Rev. Gen. Pl.* ii (1891) 813.—Rhizome short. Stipes 1–2 ft. long or more, firm, erect, straw-coloured, slightly paleaceous at the base, smooth and glabrous above. Fronds tufted, 1–3 ft. long, 9–18 in. broad, ovate or ovate-lanceolate, acuminate, pale-green, membranous, 2–3-pinnate; main rhachis stramineous, naked towards the base, densely clothed with fibrillose hairs above, as are the secondary rhachises; under-surface of frond and veins hispid with long white spreading needle-like hairs. Lower primary pinnae 9–12 in. long, ovate-lanceolate, acuminate, the upper gradually smaller and narrower; secondary pinnae lanceolate, deeply pinnatifid or again pinnate. Pinnules $\frac{1}{6}$–$\frac{1}{4}$ in. long, linear-oblong, obtuse, deeply lobed or pinnatifid, the margins usually recurved. Sori small, copious, 6–10 to a pinnule. Indusium small, soon deciduous.—Nephrodium setigerum *Hook. and Bak. Syn. Fil.* (1873) 284; *Cheesem. Man. N.Z. Fl.* (1906) 1004. Cheilanthes setigera *Blume Enum.* (1828) 138. Hypolepis setigera *Hook. Sp. Fil.* ii (1858) 62. Nephrodium tenericaule *Hook. Sp. Fil.* iv (1863) 142, t. 269; *Cheesem. in Trans. N.Z. Inst.* xx (1888) 178.

Kermadec Islands: Ravines on the north side of Sunday Island, not uncommon, *T. F. C.*; in forest and near fumaroles, *W. R. B. Oliver!*

Abundant throughout Polynesia, and ranging from tropical Australia to Malaya, India, China, and Japan.

6. **D. punctata** *C. Christen. Ind. Fil.* (1905) 287.—Rhizome long, creeping, villous with rufous spreading hairs. Stipes 6–18 in. long, firm, erect, red-brown, densely glandular-pubescent and viscous, rough with minute raised points. Fronds scattered along the rhizome, very variable in size, from $\frac{1}{2}$–3 ft. long, 3–18 in. broad, ovate-deltoid to lanceolate-deltoid, acuminate, rather membranous, glandular-pubescent on both surfaces, 3-pinnate; rhachis viscid-pubescent like the stipes. Primary pinnae in rather distant pairs, 2–10 in. long or more, 1–6 in. broad, narrow-deltoid to lanceolate, acuminate; secondary oblong or linear-oblong, acute or obtuse, deeply pinnatifid or again pinnate. Pinnules or segments oblong, crenate or angulate-dentate or pinnatifid. Veins free, once or twice forked. Sori rather large, orbicular, in 2 rows in each pinnule, close to the margin, often copious and covering the whole under-surface.—Polypodium punctatum *Thunb. Fl. Jap.* (1784) 337; *Hook. and Bak. Syn. Fil.* (1873) 312; *Benth. Fl. Austral.* vii (1872) 764; *Thoms. N.Z. Ferns* (1882) 86; *Field N.Z.* [illegible] (1890) [illegible] *esem. Man. N.Z. Fl.* (1906) 1008. 1806) 92, t. 241; *Hook. f. Fl. Nov. Zel.* 2) 272. P. viscidum *Roxb. in Beats. ol. in Tasm. Journ. Nat. Sci.* ii (1846) *Z. Inst.* xvi (1884) 347. Nephrodium bt. 4 (1902) 177.

Dryopteris punctata, C.Chr.

HYPOLEPIS RUGOSULA (Labill) J. Smith.

See transactions :

N.Z. Ferns (1882) 82; *Field N.Z. Ferns* (1890) 131, t. 5, f. 7; *Cheesem. Man. N.Z. Fl.* (1906) 1002. N. pentangularum *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 169. Aspidium decompositum *Spreng. Syst.* iv (1827) 109; *Benth. Fl. Austral.* vii (1878) 758.

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close, numerous, lanceolate, deeply pinna
oblong-ovate or oblong, obtuse, deeply o
rather small, copious; indusium pubesce
velutinum *Hook. f. Fl. Nov. Zel.* ii (1855)
378; *Hook. Sp. Fil.* iii (1860) 145; *Hoo*

Thoms. N.Z. Ferns (1882) 83; *Field N.Z. Ferns* (1890) 132, t. 20, f. 2; *Cheesem. Man. N.Z. Fl.* (1906) 1004. Aspidium velutinum *A. Rich. Fl. Nouv. Zel.* (1832) 70; *A. Cunn. Precur.* (1836) n. 222; *Raoul Choix* (1846) 38.

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Abundant throughout Polynesia, and ranging from tropical Australia to Malaya, India, China, and Japan.

6. **D. punctata** *C. Christen. Ind. Fil.* (1905) 287.—Rhizome long, creeping, villous with rufous spreading hairs. Stipes 6–18 in. long, firm, erect, red-brown, densely glandular-pubescent and viscous, rough with minute raised points. Fronds scattered along the rhizome, very variable in size, from $\frac{1}{2}$–3 ft. long, 3–18 in. broad, ovate-deltoid to lanceolate-deltoid, acuminate, rather membranous, glandular-pubescent on both surfaces, 3-pinnate; rhachis viscid-pubescent like the stipes. Primary pinnae in rather distant pairs, 2–10 in. long or more, 1–6 in. broad, narrow-deltoid to lanceolate, acuminate; secondary oblong or linear-oblong, acute or obtuse, deeply pinnatifid or again pinnate. Pinnules or segments oblong, crenate or angulate-dentate or pinnatifid. Veins free, once or twice forked. Sori rather large, orbicular, in 2 rows in each pinnule, close to the margin, often copious and covering the whole under-surface.—Polypodium punctatum *Thunb. Fl. Jap.* (1784) 337; *Hook. and Bak. Syn. Fil.* (1873) 312; *Benth. Fl. Austral.* vii (1872) 764; *Thoms. N.Z. Ferns* (1882) 86; *Field N.Z. Ferns* (1890) 136, t. 15, f. 3; *Cheesem. Man. N.Z. Fl.* (1906) 1008. P. rugulosum *Labill. Pl. Nov. Holl.* ii (1806) 92, t. 241; *Hook. f. Fl. Nov. Zel.* ii (1855) 41; *Hook. Sp. Fil.* iv (1862) 272. P. viscidum *Roxb. in Beats. St. Helena* (1816) 319. P. viscidum *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 164. P. rufobarbatum *Col. in Trans. N.Z. Inst.* xvi (1884) 347. Nephrodium punctatum *Diels in Pflanzenf.* Teil i, abt. 4 (1902) 177.

North and South Islands, Stewart Island, Chatham Islands, Auckland and Campbell Islands: Abundant throughout. Sea-level to 2500 ft.

With the exception of Africa, this is universally distributed throughout the tropics and the South Temperate Zone, advancing as far northwards as Japan. It is often confused with *Hypolepis tenuifolia*, which it much resembles in habit and in the shape of the frond. But the stipes and rhachis are markedly viscid-pubescent, the frond glandular-hairy on both surfaces, and the sori are not so close to the margin, and are not covered by a recurved lobule.

7. **D. pennigera** *C. Christen. Ind. Fil.* (1905) 223.—Rhizome stout, erect, sometimes lengthened into a short caudex 1–2 ft. high, clothed with fibrous rootlets and the bases of the old stipites. Stipes 6–12 in. long, stout, rather succulent, more or less clothed with large ovate-lanceolate brownish scales near the base, smooth and glabrous above. Fronds 2–5 ft. long, 9–18 in. broad, oblong-lanceolate, acuminate, thin and membranous, glabrous, pinnate, pinnatifid at the apex; rhachis smooth, glabrous or slightly hairy above. Pinnae numerous, opposite or nearly so, spreading, 3–9 in. long, $\frac{1}{3}$–$1\frac{1}{4}$ in. broad, the lower ones gradually reduced, narrow linear-oblong or linear-lanceolate, acuminate, truncate or almost auricled at the base, pinnatifid about half-way to the midrib; lobes oblong or ovate-oblong, slightly falcate, obtuse, entire or obscurely sinuate, basal ones often greatly lengthened. Veins pinnate in the lobes; veinlets 6–10 on each side, the 2 lowest pairs uniting at the tips with those of the adjoining lobes. Sori one to each veinlet, forming two rows much nearer the midrib than the margin.—Polypodium pennigerum *Forst. f. Prodr.* (1786) 444; *Hook. f. Handb. N.Z. Fl.* (1864) 381; *Hook. Sp. Fil.* v (1864) 7; *Hook. and Bak. Syn. Fil.* (1873) 317; *Thoms. N.Z. Ferns* (1882) 87; *Field N.Z. Ferns* (1890) 137, t. 25, f. 3, *and* t. 26, f. 4; *Cheesem. Man. N.Z. Fl.* (1906) 1009. P. subsimile *Col. in Trans. N.Z. Inst.* xx (1888) 233. Goniopteris pennigera *J. Smith Lond. Journ. Bot.* iv (1841) 54; *Hook. f. Fl. Nov. Zel.* ii (1855) 40. Aspidium pennigerum *Swartz Syn. Fil.* (1806) 49; *A. Rich. Fl. Nouv. Zel.* (1832) 67; *A. Cunn. Precur.* (1836) n. 217; *Raoul Choix* (1846) 38. Nephrodium pennigerum *Presl Rel. Haenk.* (1825) 35.

Var. **Hamiltoni** *Col. in Trans. N.Z. Inst.* xiv (1882) 338.—Smaller and more delicate, pale-green. Fronds 1–2 ft. long, 3–5 in. broad; pinnae irregular, crisped, pinnatifid three-quarters of the way to the midrib or more; lobes coarsely and sharply irregularly dentate. Veinlets confined to the lobes, the lowest pair not meeting those of the adjoining lobes. Sori midway between the midrib and the margin. A very peculiar plant, but possibly only an abnormal state.

North and South Islands, Chatham Islands: From the North Cape to Foveaux Strait, abundant in woods by the side of streams, &c. Sea-level to 2000 ft. Var. *Hamiltoni*: Kereru (Hawke's Bay), *A. Hamilton!*

A very distinct and well-marked species. According to Christensen, it occurs in Polynesia as well as in New Zealand. Mr. Carse has pointed out to me that in large specimens the basal lobes of the pinnae are often greatly lengthened, a peculiarity that does not seem to have been mentioned in previous descriptions.

8. **D. parasitica** *O. Kuntze Rev. Gen. Pl.* ii (1891) 811.—Rhizome very shortly creeping or tufted and erect, densely rooting. Stipes 9–24 in. long, slender, greenish, naked or pubescent with soft spreading hairs. Fronds 1–3 ft. long, 6–12 in. broad, oblong-lanceolate, acuminate, gradually narrowed at the base, pale-green, membranous and flaccid, sparingly pilose on both surfaces or almost glabrous when old, pinnate; rhachis pale, pilose with spreading hairs. Pinnae numerous, the lower ones gradually dwarfed, spreading, sessile, 3–6 in. long, about $\frac{3}{4}$ in. broad, lanceolate, acuminate,

pinnatifid about half-way to the midrib; lobes short, oblong, obtuse, entire or nearly so. Veins pinnate in the lobes; veinlets 5–8 on each side, the lower ones uniting at the tips with those of the adjoining lobes. Sori copious, about half-way between the margin and the midrib. Indusium cordate-reniform, usually villous. — Polypodium parasiticum *Linn. Sp. Plant.* (1753) 1090. Nephrodium molle *R. Br. Prodr.* (1810) 149; *Hook. Sp. Fil.* iv (1862) 67; *Hook. f. Handb. N.Z. Fl.* (1864) 177; *Hook. and Bak. Syn. Fil.* (1873) 293; *Thoms. N.Z. Ferns* (1882) 84; *Field N.Z. Ferns* (1890) 133, t. 23, f. 5; *Cheesem. Man. N.Z. Fl.* (1906) 1006. Aspidium molle *Swartz Syn. Fil.* (1806) 49; *Benth. Fl. Austral.* vii (1878) 756. Polypodium nymphale *Forst. f. Prodr.* (1786) n. 442.

Kermadec Islands: Sunday Island, not uncommon, *McGillivray, T. F. C., W. R. B. Oliver!* North Island: Auckland—North Cape district, a small patch by the side of the Mangatete Stream, flowing into Rangaunu Harbour, *R. H. Matthews!* Thermal-springs district, by the banks of the Otumakokori, or Boiling River (near Waiotapu), *Captain G. Mair! T. F. C., T. Kirk!* margins of hot springs at Wairakei (Taupo), *C. J. Norton! T. F. C.*

Abundant in tropical and warm temperate countries almost throughout the world.

9. **D. gongylodes** *O. Kuntze Rev. Gen. Pl.* ii (1891) 811.—Rhizome long, stout, creeping, sparingly clothed with blackish-brown scales. Stipes 6–14 in. long, smooth, erect, almost black at the base, brownish above, naked or with a few chaffy scales. Fronds 6–18 in. long without the stipes, 3–9 in. broad, oblong or ovate-oblong, acuminate, somewhat rigid, coriaceous, glabrous, pinnate; rhachis smooth, naked. Pinnae 9–15 pairs, subopposite, ascending or spreading, the lower ones not reduced in size, 2–5 in. long, $\frac{1}{3}$–$\frac{1}{2}$ in. broad, linear-lanceolate, pinnatifid from $\frac{1}{3}$ to $\frac{1}{2}$ the way to the midrib; lobes spreading, ovate or ovate-triangular, subacute or obtuse, entire or nearly so. Veins pinnate in each lobe; veinlets 6–8 on each side, the lower ones united at the tips with those of the adjoining lobes. Sori copious, nearer the margin than the midrib, mostly placed in the lobes, but usually extending below them as well.—Aspidium gongylodes *Schkuhr Krypt. Gew.* (1809) 193. Nephrodium unitum *R. Br. Prodr.* (1810) 149; *Hook. f. Handb. N.Z. Fl.* (1864) 749; *Hook. and Bak. Syn. Fil.* (1873) 289; *Thoms. N.Z. Ferns* (1882) 83; *Field N.Z. Ferns* (1890) 134, t. 23, f. 1; *Cheesem. Man. N.Z. Fl.* (1906) 1005. N. inaequilaterum *Col. in Trans. N.Z. Inst.* xx (1888) 229. Aspidium unitum *Swartz Syn. Fil.* (1806) 47; *Benth. Fl. Austral.* vii (1878) 755.

North Island: Swamps in the North Cape district, at Houhoura, Waihi, Rangaunu Harbour, Ahipara, &c., *J. B. Simpson! R. H. Matthews! T. F. C.;* hot springs at Miranda, Thames, *J. Adams!* hot-water swamps in the Thermal-springs district, not uncommon from Maketu and Rotorua to Waiotapu, Rotokawa, Wairakei, and Tokaanu, *Captain G. Mair! T. Kirk! T. F. C., Norton! Field,* &c. Sea-level to 1800 ft.

An abundant fern in most tropical and warm-temperate countries.

11. **ARTHROPTERIS** J. Smith.

Rhizome long, slender, climbing or creeping. Stipes articulated near its base, or a little distance above the rhizome. Fronds scattered along the rhizome, pinnate; pinnae articulated on the rhachis. Veins simple or forked or pinnate, venules free. Sori globose, punctiform, situated on the tip of a vein. Indusium reniform, or altogether absent in the New Zealand species. Sporangia girt by an incomplete vertical ring.

A small genus of 3 species; one (*A. altescandens*) confined to the island of Juan Fernandez; another (*A. obliterata*) spread over the tropics of Asia, Africa, Australia, and Polynesia; and the New Zealand species, which is also found in Australia and New Caledonia.

1. **A. tenella** *J. Smith in Hook. f. Fl. Nov. Zel.* ii (1855) 43, t. 82.—Rhizome very long, slender, rigid, wiry, climbing up the trunks of trees or over rocks, clothed with chestnut-brown scales with a dark base. Stipes short, 1–3 in. long, jointed near the rhizome, smooth or more or less scaly. Fronds scattered along the rhizome, erect or pendulous, 1–2 ft. long, 2–5 in. broad, linear-oblong or lanceolate, dark-green, thinly coriaceous, quite glabrous, pinnate; rachis smooth or slightly scaly. Pinnae distant, alternate, shortly stipitate, articulate on the rhachis, spreading, 1½–3 in. long, ¼–½ in. broad, lanceolate, attenuate at the tip, obliquely cuneate at the base, entire or obscurely undulate-crenate. Veins all free, once or twice forked. Sori globose, in 2 series in each pinnule, almost close to the margin.—Polypodium tenellum *Forst. f. Prodr.* (1786) n. 440; *A. Cunn. Precur.* (1836) n. 176; *Raoul Choix* (1846) 37; *Hook. Sp. Fil.* iv (1862) 217; *Hook. f. Handb. N.Z. Fl.* (1864) 380; *Hook. and Bak. Syn. Fil.* (1873) 337; *Benth. Fl. Austral.* vii (1878) 764; *Thoms. N.Z. Ferns* (1882) 88; *Field N.Z. Ferns* (1890) 139, t. 4, f. 4; *Cheesem. Man. N.Z. Fl.* (1906) 1011.

North Island: In woods from the Three Kings Islands and the North Cape to Cook Strait, but often local. South Island: Vicinity of Nelson, *T. Kirk;* Banks Peninsula, *Armstrong.*

Also in Norfolk Island, Australia, and New Caledonia.

12. **NEPHROLEPIS** Schott.

Rhizome short and indistinct, or long and creeping, sometimes emitting long wiry creeping and rooting stolons, from which new plants originate. Fronds long and narrow, coriaceous or submembranous, pinnate; pinnae jointed upon the rhachis, often deciduous, entire or crenate-serrate, upper surface frequently marked with white cretaceous dots. Veins free. Sori roundish, dorsal, placed on the tip of the upper branch of a vein, usually close to the margin. Indusium cordate or reniform or almost lunate, attached by a broad base. Sporangia stalked, surrounded by an incomplete vertical ring, bursting transversely.

A small genus of 7 or 8 species, widely distributed in the tropical regions of both hemispheres. The two New Zealand species have the range of the genus.

Pinnae ½–1 in. long, oblong or linear-oblong, obliquely cordate at the base .. .. 1. *N. cordifolia.*
Pinnae 1½–3 in. long, oblong-lanceolate, usually obliquely truncate at the base .. .. 2. *N. exaltata.*

1. **N. cordifolia** *Presl Tent. Pterid.* (1836) 79.—Rhizome short, suberect or oblique, emitting numerous long and wiry scaly stolons, which root here and there and produce new plants, sometimes bearing small scaly tubers. Stipes short, 1–4 in. long, red-brown, glossy, more or less clothed with deciduous linear scales. Fronds numerous, tufted, 1–3 ft. long, 1½–2 in. broad, linear-lanceolate, acuminate, pale-green, membranous, pinnate; rhachis usually shaggy with linear flexuose scales. Pinnae very numerous, close-set, often imbricated, horizontal, ½–1 in. long, ¼–½ in. broad, oblong

or linear-oblong, obtuse or subacute, cordate at the base, the upper edge distinctly auricled, the lower shorter and rounded; margins crenate-toothed; the lower pinnae shorter and broader and sterile. Sori in two rows on the pinnae, rather nearer the margin than the midrib. Indusium reniform, firm, membranous.—*Hook. and Bak. Syn. Fil.* (1873) 300; *Thoms. N.Z. Ferns* (1882) 85; *Field N.Z. Ferns* (1890) 134, t. 20, f. 3; *Cheesem. Man. N.Z. Fl.* (1906) 1006. N. tuberosa *Presl Tent. Pterid.* (1836) 79; *Hook. Sp. Fil.* iv (1862) 151; *Hook. f. Handb. N.Z. Fl.* (1864) 379. N. flexuosa *Col. in Trans. N.Z. Inst.* xx (1888) 231. Aspidium cordifolium *Swartz Syn. Fil.* (1806) 45; *Benth. Fl. Austral.* vii (1878) 754.

Kermadec Islands: Sunday Island, not uncommon, *W. R. B. Oliver!* North Island: Auckland—Thermal-springs district, in localities heated by warm water; Otumakokori Stream (near Waiotapu), *Captain G. Mair! T. Kirk! T. F. C.;* Wairakei, Karapiti, and other localities at Taupo, *Hochstetter, C. J. Norton! T. F. C.*

An abundant tropical fern, extending northwards to Japan and southwards to New Zealand.

2. **N. exaltata** *Schott Gen. Fil.* (1834) t. 3.—Rhizome short, indistinct, emitting numerous long wiry creeping stolons. Stipes 3–9 in. long, stout, erect, deciduously scaly. Fronds numerous, 1–3 ft. long, 4–5 in. broad, oblong-lanceolate, rather coriaceous, pinnate; rhachis and costae and sometimes the under-surface of the pinnae more or less scaly-tomentose or woolly. Pinnae numerous, close-set, horizontally spreading, $1\frac{1}{2}$–3 in. long, $\frac{1}{3}$–$\frac{2}{3}$ in. broad, lanceolate or oblong-lanceolate, acute, broadly obliquely truncate or subcordate at the base, the upper edge slightly auricled, the lower rounded; margins crenate-serrate. Sori close to the margin, numerous, rather small. Indusium firm, almost coriaceous, distinctly reniform.—*Hook. Sp. Fil.* iv (1862) 152; *Hook. and Bak. Syn. Fil.* (1873) 301; *Cheesem. in Trans. N.Z. Inst.* xx (1888) 178; *Man. N.Z. Fl.* (1906) 1007. Aspidium exaltatum *Swartz Syn. Fil.* (1806) 45; *Benth. Fl. Austral.* vii (1878) 754.

Kermadec Islands: Sunday Island, sandy flats in Denham Bay, *T. F. C.;* near fumaroles in Denham Bay and in main crater, *W. R. B. Oliver!*

An abundant tropical fern all round the world.

13. **LEPTOLEPIA** Mettenius.

Rhizome long and creeping, clothed with narrow-linear scales. Stipes not articulated on the rhizome. Fronds large, many times pinnate; ultimate segments narrow-linear. Veins free. Sori terminal at the tip of a short lateral veinlet. Indusium attached to the vein, broadly ovate or almost orbicular, its free margin toothed or scalloped. Sporangia numerous, girt by an incomplete vertical ring.

A monotypic genus confined to New Zealand.

1. **L. novae-zealandiae** *Kuhn Chaetopt.* (1882) 348.—Rhizome long, branched, wide-creeping, as thick as a quill, clothed with yellowish-brown linear scales. Stipes 6–18 in. long, red-brown, firm, erect, rough and bristly at the base, smooth and polished above. Fronds 1–2 ft. long, 6–12 in. broad, ovate-oblong to deltoid, acuminate, firm but scarcely coriaceous, tripinnate; rhachis flexuose, channelled above, glabrous or pubescent at the axils. Primary pinnae oblong-lanceolate, acuminate;

secondary about the same shape, pinnate below, pinnatifid at the tips. Pinnules about ½ in. long, ovate-lanceolate, deeply pinnatifid; ultimate segments or lobes very narrow, acute. Sori very numerous, placed at the tip of a short lateral veinlet on the lobes of the pinnules. Indusium broadly ovate or almost orbicular, membranous, jagged, attached to the tip of the vein under the sorus, its sides quite free.—Davallia novae-zelandiae *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 182; *Hook. Sp. Fil.* i (1846) 158, t. 51B; *Garden Ferns*, 51; *Hook. f. Fl. Nov. Zel.* ii (1855) 19; *Handb. N.Z. Fl.* (1864) 358; *Hook. and Bak. Syn. Fil.* (1873) 91; *Thoms. N.Z. Ferns* (1882) 49; *Field N.Z. Ferns* (1890) 74, t. 18, f. 2; *Cheesem. Man. N.Z. Fl.* (1906) 956. D. hispida *Heward mss. ex Sp. Fil.* i (1846) 158. Acrophorus hispidus *Moore in Proc. Linn. Soc.* ii (1854) 286.

North and South Islands: In woods from the Bay of Islands southwards to Foveaux Strait, but often local. Sea-level to 2000 ft.

A very handsome and distinct species, with an unusually finely cut frond. It has been referred by turns to the genera (or divisions of *Davallia*) *Leucostegia*, *Microlepia*, and *Acrophorus*, and has finally been made the type of a new genus by Mettenius.

14. **DAVALLIA** Smith.

Rhizome stout and wide-creeping, paleaceous. Stipes always articulated on the rhizome. Fronds in the majority of the species ample, 3–4-pinnate, more rarely pinnate or bipinnate; texture usually coriaceous. Veins simple or forked, free. Sori close to or at the margin of a segment of the frond, terminating a vein or veinlet. Indusium attached by both its base and sides, open at the top, narrow cup-shaped or cylindrical. Sporangia numerous, girt by an incomplete vertical ring, bursting transversely.

In this work I have limited the genus *Davallia* to the meaning attached to it by Diels and Christensen. It still contains, however, the sections *Eudavallia*, *Leucostegia*, *Prosaptia*, and *Scyphularia* of the "Synopsis Filicum," and thus includes between 50 and 60 well-authenticated species. These are mostly distributed in the tropics of the Eastern Hemisphere; but the centre of the genus is doubtless in the Polynesian and Malayan archipelagos. The single New Zealand species is closely allied to the Madeiran and Canary Island *D. canariensis*.

[*Davallia Forsteri* Carruthers is a name applied to Forster's *Adiantum clavatum*, a plant said to have been gathered in Dusky Sound during Cook's second voyage, but not since observed. Mr. Baker remarks that it is very close to the Polynesian *Odontosoria scoparia*; and Mr. W. R. B. Oliver, who has recently compared Forster's specimens with that plant, informs me that the two are identical. In all probability there has been an accidental admixture of specimens.]

1. **D. Tasmani** *Cheesem. in Trans. N.Z. Inst.* xxiii (1891) 416.—Rhizome long, stout, as thick as the finger, wide-creeping, densely clothed with chestnut-brown subulate ciliated scales. Stipes strong, rigid, smooth, 3–9 in. long. Fronds 4–12 in. long, 3–9 in. broad, broadly deltoid or pentagonal, very thick and coriaceous, quite smooth and glabrous, 2–3-pinnatifid. Lower pinnae much the largest, broadly deltoid or rhomboidal; upper narrower, ovate or lanceolate. Pinnules oblong, cut down nearly to the base into 6–9 segments; segments short, oblong, obtuse. Sori very numerous, usually one to each segment, marginal, the segment usually produced on the outer side into a stout projecting horn. Indusium narrow cup-shaped, attached by the sides as well as the

base.—*Field N.Z. Ferns* (1890) 75, t. 24, f. 5; *Bak. in Ann. Bot.* v (1890–91) 201; *Cheesem. Man. N.Z. Fl.* (1906) 955; *Ill. N.Z. Fl.* ii (1914) t. 237.

North Island: Three Kings Islands, abundant, *T. F. C.*

Very close to the northern *D. canariensis* L., but stouter and more coriaceous, and not so finely cut.

15. **LINDSAYA** Dryander.

Usually small subcoriaceous bright-green ferns. Rhizome creeping or short and tufted. Fronds pinnate or 2–3-pinnatifid; pinnae often 1-sided. Veins free, or anastomosing in a few species not found in New Zealand. Sori forming a continuous or more or less interrupted line within the margin of the frond and parallel to it, placed at the apex of 2 or more veins and uniting them. Indusium apparently double and 2-valved, opening outwards; upper valve formed of the more or less altered margin of the frond; lower valve thin, membranous, continuous. Sporangia numerous, stalked, bursting transversely; ring vertical, incomplete.

Understood in the sense of the "Synopsis Filicum," this is a genus of about 75 species, mainly found in the tropics of both hemispheres. Two of the New Zealand species extend to Australia, Tasmania, and Polynesia, one of them reaching New Caledonia as well, the remaining one is endemic.

* *Eulindsaya.* Pinnae unilateral.

Fronds linear, simply pinnate; pinnae small, flabellate ..	1. *L. linearis.*

** *Isoloma.* Pinnae equilateral.

Fronds 2–3-pinnatifid, dark-green, oblong-lanceolate, broadest at the base; ultimate segments obovate, rounded at the tip ..	2. *L. cuneata.*
Fronds 2–3-pinnatifid, pale-green, lanceolate, not broadest at the base; ultimate segments linear-cuneate, truncate at the tip ..	3. *L. viridis.*

1. **L. linearis** *Swartz Syn. Fil.* (1806) 118, 318, t. 3.—Rhizome slender, creeping, clothed with yellowish-brown scales. Stipes 2–9 in. long, slender, flexuous, wiry, dark red-brown, smooth and shining. Fronds 3–8 in. long, about $\frac{1}{2}$ in. broad, narrow-linear, membranous, pinnate; barren ones shorter and broader than the fertile, often prostrate; fertile always erect; rhachis naked, glossy. Pinnae of the fertile fronds $\frac{1}{6}$–$\frac{1}{3}$ in. long, flabellate or cuneate, sessile or nearly so, not lobed or very indistinctly so, revolute when dry. Sori forming a continuous line along the upper edge. Indusium broad, membranous; both valves minutely and irregularly laciniate. Pinnae of the barren fronds $\frac{1}{4}$–$\frac{1}{2}$ in. long or more, deeply lobed or incised. —*A. Rich. Fl. Nouv. Zel.* (1832) 85; *A. Cunn. Precur.* (1836) n. 213; *Raoul Choix* (1846) 38; *Hook. Sp. Fil.* i (1846) 206; *Hook. f. Fl. Nov. Zel.* ii (1855) 19; *Handb. N.Z. Fl.* (1864) 359; *Hook. and Bak. Syn. Fil.* (1873) 104; *Benth. Fl. Austral.* vii (1878) 719; *Thoms. N.Z. Ferns* (1882) 51; *Field N.Z. Ferns* (1890) 77, t. 19, f. 4, 4A; *Cheesem. Man. N.Z. Fl.* (1906) 958. L. trilobata *Col. in Trans. N.Z. Inst.* xvi (1884) 345.

North and South Islands, Stewart Island, Chatham Islands. From the North Cape southwards, usually on clay hills or in cold swampy soils, most plentiful to the north of the East Cape, rare and local in the South Island. Sea-level to 2000 ft.

Also found throughout the whole of eastern Australia and Tasmania, in Norfolk Island, and in New Caledonia. Mr. Colenso's *L. trilobata*, which appears to be the most abundant state in New Zealand, only differs in the pinnae of the barren frond being rather more deeply lobed than usual.

2. **L. cuneata** *C. Christen. Ind. Fil.* (1905) 25.—Rhizome creeping, slender, clothed with reddish brown scales. Stipes 3–8 in. long, rather rigid, slender, wiry, angled, polished, glabrous or slightly scaly towards the base. Fronds 3–8 in. long, 1½–4 in. broad, oblong-lanceolate or linear-oblong, more rarely ovate-oblong, subcoriaceous, dark-green, bipinnate. Primary pinnae nearly opposite, 1–3 in. long, lanceolate, erecto-patent, pinnatifid above, pinnate below. Pinnules or segments obovate or rounded-cuneate, entire or more or less toothed or lobed, rarely again pinnatifid. Veins obscure, flabellately branched. Sori forming a continuous intramarginal line round the apex of the lobes.—*Dryand. in Trans. Linn. Soc.* iii (1797) 43, t. 11; *A. Rich. Fl. Nouv. Zel.* (1832) 85; *A. Cunn. Precur.* (1836) n. 214; *Raoul Choix* (1846) 38; *Hook. Sp. Fil.* i (1846) 218; *Hook. f. Fl. Nov. Zel.* ii (1855) 19; *Handb. N.Z. Fl.* (1864) 359; *Hook. and Bak. Syn. Fil.* (1873) 110; *Benth. Fl. Austral.* vii (1878) 720; *Thoms. N.Z. Ferns* (1882) 52; *Field N.Z. Ferns* (1890) 78, t. 19, f. 1; *Cheesem. Man. N.Z. Fl.* (1906) 958. Adiantum cuneatum *Forst. f. Prodr.* (1786) n. 461.

Var. **Lessonii** *Hook. f. Fl. Nov. Zel.* ii (1855) 19.—Fronds simply pinnate or 2-pinnate at the base alone; pinnae oblong-lanceolate, entire or lobed or pinnatifid.—L. Lessonii *Bory in Duper. Voy. Coq.* i (1828) 278, t. 37, f. 2; *A. Rich. Fl. Nouv. Zel.* (1832) 84; *A. Cunn. Precur.* (1836) n. 212; *Raoul Choix* (1846) 38; *Hook. Sp. Fil.* i (1846) 217.

North and South Islands: From Hokianga southwards to Foveaux Strait, common in the North Island, local on the eastern side of the South Island. Sea-level to 2500 ft.

Also in Australia, Tasmania, and the Fiji Islands.

3. **L. viridis** *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 174.—Rhizome very short, suberect. Stipites densely tufted at the top of the rhizome, 1–4 in. long, slender, wiry, dark chestnut-brown, angled, smooth and polished, glabrous except a tuft of pale-brown scales at the base. Fronds 6–14 in. long, 1–1½ in. broad, lanceolate, acuminate, pale-green, subcoriaceous, 2–3-pinnatifid; rhachis slender, flexuose, shining, naked. Primary pinnae alternate, ascending, the lower ones much reduced in size, rhomboid-lanceolate; secondary obversely deltoid, simple or deeply lobed or again flabellately pinnate. Ultimate segments about ⅙ in. long, cuneate or linear-cuneate, truncate. Veins simple or forked. Sori very numerous, at the tips of the segments. Indusium membranous, transversely oblong, from rather broader than long to twice as broad as long; outer valve (tip of the segment) irregularly erose.—*Bak. in Journ. Bot.* (1875) 109; *T. Kirk in Trans. N.Z. Inst.* x (1878) 396; *Thoms. N.Z. Ferns* (1882) 51; *Field N.Z. Ferns* (1890) 79, t. 21, f. 2; *Cheesem. Ill. N.Z. Fl.* ii (1914) t. 238. L. trichomanoides (*in part*) *Hook. Sp. Fil.* i (1846) 218; *Hook. f. Fl. Nov. Zel.* ii (1855) 19; *Handb. N.Z. Fl.* (1864) 359 (*not of Dryand.*). L. microphylla *Hook. and Bak. Syn. Fil.* (1873) 110 (*the New Zealand plant, not of R. Br.*).

North Island: Auckland—Great Barrier Island, *T. Kirk, Winkelmann!* Little Barrier Island, *Miss Shakespear!* Thames, *Adams!* Henderson's Creek, *T. F. C.;* Huia Creek, *T. Kirk;* near Mauku, *H. Carse;* between Tauranga and Rotorua, *Colenso!* East Cape district, *Bishop Williams.* Taranaki—Mount Egmont Ranges, *J. M. Brame.* Wellington—Upper Wanganui, and from thence to the base of the Tararua Range,

H. C. Field. SOUTH ISLAND: Nelson—Massacre Bay, *Lyall;* Torrent Bay, *Kingsley.* Westland—Near Hokitika, *W. H. Tipler;* Giles Creek, near Westport; Millerton; near Charleston, *W. Townson!* Otago—Sounds of the West Coast, *Buchanan.*

A very beautiful and distinct species, usually found on dripping rocks by waterfalls, or on the mossy banks of streams.

16. **ATHYRIUM** Roth.

Rhizome short, stout, erect or ascending, rarely creeping, chaffy or scaly at the top. Stipes few or many, tufted at the top of the rhizome. Fronds 2-3-pinnatifid, usually herbaceous in texture. Veins free. Sori placed along the veins, short, oblong, thick and swollen, curved or inflexed, rarely quite straight. Indusium inflated, splitting irregularly; sometimes two indusia are placed side by side on opposite sides of the vein, opening outwards as in *Diplazium.* Sporangia stalked, girt by an incomplete vertical ring.

A genus of 60 or 70 species, intermediate in character between the typical *Asplenia* and *Diplazium.* The genus has an almost world-wide range.

1. **A. umbrosum** *Presl Tent. Pterid.* (1836) 98.—Rhizome short, stout. Stipes 1–2 ft. long, stout, erect, scaly towards the base, smooth and naked above, brownish-green. Fronds variable in size, 1–4 ft. long without the stipes, 9 in. to 3 ft. broad, broadly ovate or deltoid, spreading, often drooping towards the tip, pale-green, membranous, flaccid, 2–3-pinnate; rhachis slender, flexuous, naked. Primary pinnae rather distant, 6–18 in. long, ovate-lanceolate to oblong-ovate, acute or acuminate; secondary 1–2 in. long, lanceolate, deeply pinnatifid or again pinnate. Ultimate segments $\frac{1}{4}$–$\frac{1}{2}$ in. long, oblong or oblong-lanceolate, acute, sessile and decurrent, usually deeply inciso-crenate; veins pinnate, simple or forked. Sori copious, usually about 5–6 to each pinnule, short, oblong. Indusium large, tumid, membranous.—Asplenium umbrosum *J. Smith in Hook. Lond. Journ. Bot.* iv (1841) 174; *Hook. and Bak. Syn. Fil.* (1873) 229; *Benth. Fl. Austral.* vii (1878) 749; *Thoms. N.Z. Ferns* (1882) 77; *Field N.Z. Ferns* (1890) 125, t. 5, f. 2; *Cheesem. Man. N.Z. Fl.* (1906) 995. A. australe *Brack. U.S. Expl. Exped.* xvi (1854) 173; *Hook. Sp. Fil.* iii (1860) 232; *Hook. f. Handb. N.Z. Fl.* (1864) 374. A. Brownii *J. Smith ex Hook. f. Fl. Nov. Zel.* ii (1855) 36; *Hook. Ic. Plant.* t. 978. Allantodia australe *R. Br. Prodr.* (1810) 149. A. tenera *R. Br. l.c.; A. Cunn. Precur.* (1836) n. 186; *Raoul Choix* (1846) 37. Polypodium umbrosum *Ait. Hort. Kew,* iii (1789) 466.

NORTH ISLAND: Not uncommon from the Bay of Islands to the East Cape and Taranaki, from thence somewhat rare and local to Cook Strait, usually on calcareous or alluvial soils. SOUTH ISLAND: Nelson—*Travers;* near Foxhill, *T. F. C.;* West Wanganui, *Kingsley.* Westland—Banks of Buller River, near Westport, *W. Townson!*

Also found in Australia and Tasmania, the Malay Archipelago, India, tropical Africa to the Canary Islands, the Azores, and Madeira.

17. **DIPLAZIUM** Swartz.

Rhizome erect and sometimes arborescent, or slender and wide-creeping. Stipes not articulated to the rhizome. Fronds varying in size, 1–5 ft., 1–3-pinnate; texture herbaceous or rarely subcoriaceous. Veins forked or

pinnate, free except in the sections *Anisogonium* or *Hemidictyum*. Sori linear, along opposite sides of many of the veins, each side having an indusium of its own. Sporangia stalked, girt by an incomplete vertical ring.

A genus of nearly 200 species, widely diffused in the tropics of both hemispheres.

1. **D. japonicum** *Bedd. Ferns Brit. Ind. Suppl.* (1876) 12.—Rhizome long, slender, creeping, branched, densely scaly at the tip. Stipes 3–9 in. long, slender, pale-brown or straw-coloured, scaly when young, especially near the base. Fronds 6–12 in. long without the stipes, $2\frac{1}{2}$–5 in. broad, ovate-lanceolate, long-acuminate, pale-green, thin and membranous, glabrous on both surfaces or sprinkled with a few weak hairs, pinnate below, pinnatifid towards the apex; rhachis slender, slightly scaly. Pinnae spreading, rather distant, $1\frac{1}{2}$–3 in. long, lanceolate, acuminate, deeply pinnatifid; lobes about $\frac{1}{3}$ in. long, close, oblong, obtuse, slightly toothed or nearly entire. Veins pinnate in the lobes; veinlets 4–6 on each side, simple or forked. Sori linear-oblong, usually occupying all the veinlets, reaching two-thirds of the distance from the midrib to the margin, the lowest one in each lobe usually diplazioid.—Asplenium japonicum *Thunb. Fl. Jap.* (1784) 334; *Hook. and Bak. Syn. Fil.* (1873) 234; *Benth. Fl. Austral.* vii (1878) 750; *Cheesem. in Trans. N.Z. Inst.* xxii (1890) 448; *Man. N.Z. Fl.* (1906) 996. A. Schkuhrii *Hook. Sp. Fil.* iii (1860) 251.

Kermadec Islands: Ravines on Sunday Island, not common, *T. F. C., W. R. B. Oliver!* North Island: Auckland—Banks of the Awanui River (near Kaitaia), *R. H. Matthews! H. Carse!* Okura River (Bay of Islands), *Miss Clarke!* Waiaruhia River (Bay of Islands), *T. H. Trevor!* Northern Wairoa River, *G. E. Smith!*

This appears to be a widely distributed species, ranging through Polynesia to the Malay Archipelago, India, China, and Japan. It is possible that Mr. Kirk's *A. umbrosum* var. *tenuifolium* (Trans. N.Z. Inst. xxiii (1891) 424), of which I have seen no specimens, may be identical with it.

18. **ASPLENIUM** Linn.

Rhizome usually short and thick, more rarely long and creeping. Fronds tufted at the top of the rhizome or scattered, stipitate, pinnate or 2–3-pinnate or decompound, simple and entire in a few species not found in New Zealand. Venation variable, free in the great mass of the species, including those found in New Zealand. Sori linear or oblong, placed upon the veins, more or less oblique with respect to the costa, remote from the margin or close to it when the frond is much divided. Indusium the same shape as the sorus, attached by its side to the vein, straight or rarely curved, flat or tumid, opening towards the costa. Sporangia stalked, surrounded by an incomplete vertical ring, bursting transversely.

Asplenium is one of the largest genera of Ferns, containing about 350 species, distributed through both the tropical and temperate regions of the world. Of the 13 species found in New Zealand 3 appear to be endemic, another is found elsewhere only in Australia, the remaining 9 are widely spread. The New Zealand species present exceptional difficulties to the student, on account of their extreme variability and the manner in which several of them are connected by intermediate forms. Thus *A. obtusatum* and *A. lucidum* not only run into one another, but are connected by transitional varieties with *A. bulbiferum* and *A. flaccidum*. *A. Richardi* almost merges into *A. flaccidum* on the one side and *A. Hookerianum* on the other, while *A. bulbiferum* and *A. flaccidum*, distinct enough in their ordinary states, are almost united by some of their aberrant varieties. With such a complex network of variation it is not surprising that the species are difficult of limitation and their characters arbitrary.

* Fronds pinnate (2-pinnate below in *A. lucidum* var. *Lyallii*). Sori remote from the margin.

Fronds slender, 6–14 in., decumbent or prostrate, rooting at the naked tip. Pinnae $\frac{1}{4}$–$\frac{1}{2}$ in., flabellate	1. *A. flabellifolium.*
Fronds slender, 3–12 in., rigid, erect. Pinnae $\frac{1}{4}$–$\frac{1}{2}$ in., oblong or obovoid	2. *A. Trichomanes.*
Fronds 1–2 ft., coriaceous, not fleshy, brownish-green. Pinnae $1\frac{1}{2}$–4 in. × $\frac{1}{2}$–1 in., broadly lanceolate, acuminate, deeply lobed. Veins close, distinct, flabellately divided at the base of the pinnae	3. *A. adiantoides.*
Characters of *A. adiantoides* but pinnae narrow-lanceolate, caudate	4. *A. caudatum.*
Fronds $\frac{1}{2}$–$1\frac{1}{2}$ ft., thick and fleshy. Pinnae $\frac{3}{4}$–$1\frac{1}{2}$ in., oblong, obtuse. Veins obscure, parallel	5. *A. obtusatum.*
Fronds 1–3 ft., coriaceous, bright-green. Pinnae 2–6 in. × $\frac{3}{4}$–2 in., oblong-lanceolate, acuminate, serrate. Veins obscure, parallel	6. *A. lucidum.*
Fronds 1–$1\frac{1}{2}$ ft., bright shining-green. Pinnae 3–5 in. × $\frac{1}{2}$–$\frac{3}{4}$ in., caudate-acuminate, deeply serrate or pinnatifid	7. *A. scleroprium.*
Fronds 2–10 in. × 1–4 in., greyish-green. Pinnae obtuse or acute, sometimes pinnatifid at the base	8. *A. anomodum.*

** Fronds 2–3-pinnate; segments generally narrow. Sori usually one to each segment, often close to the margin.

Fronds 3–12 in., erect, membranous, usually 2-pinnate. Pinnae and pinnules distinctly stipitate, the latter short, rhomboid-cuneate. Sori few, rather large	9. *A. Hookerianum.*
Fronds 1–4 ft., oblong-lanceolate, erect or drooping, often proliferous, 2–3-pinnate. Pinnules lanceolate, $\frac{1}{2}$–$1\frac{1}{2}$ in. long	10. *A. bulbiferum.*
Fronds 6–12 in., ovate, coriaceous, rigid, erect, 2–3-pinnate. Pinnules ovate-rhomboid, pinnatifid; segments narrow-linear, $\frac{1}{12}$–$\frac{1}{8}$ in. long	11. *A. Richardi.*
Fronds $\frac{1}{2}$–3 ft., pendulous or erect, thick and coriaceous, pinnate or 2-pinnate. Pinnules very narrow-linear ..	12. *A. flaccidum.*
Fronds 1–3 ft., erect or pendulous, broadly ovate or oblong, 3–4-pinnate; pinnules narrow-linear-spathulate ..	13. *A. Shuttleworthianum.*

1. **A. flabellifolium** *Cav. Descr.* (1802) 257.—Rhizome short, stout, clothed at the top with blackish-brown subulate scales. Stipes 1–4 in. long, rarely more, slender, flexuous, smooth or slightly scaly, green above, dark-brown below. Fronds few, tufted at the top of the rhizome, weak, decumbent or prostrate, rooting at the elongated and naked apex, 6–14 in. long, $\frac{1}{2}$–1 in. broad, linear, membranous, flaccid, pinnate; rhachis smooth, green. Pinnae 10–25 pairs, distant, the upper becoming gradually smaller and disappearing some distance below the tip of the rhachis, very variable in size and shape, shortly stipitate, $\frac{1}{4}$–$\frac{1}{2}$ in. long and broad, flabellate or rhomboid-cuneate or orbicular-reniform, sometimes auricled or almost 3-lobed at the base, coarsely crenate-toothed; veins flabellate. Sori several to each pinna, oblique, linear-oblong when young, often confluent when old.—*A. Cunn. Precur.* (1836) n. 192; *Raoul Choix* (1846) 37; *Hook. Exot. Fil.* t. 208; *Sp. Fil.* iii (1860) 146; *Hook. f. Fl. Nov. Zel.* ii (1855) 33; *Handb. N.Z. Fl.* (1864) 372; *Hook. and Bak. Syn. Fil.* (1873) 195; *Benth. Fl. Austral.* vii (1878) 745; *Thoms. N.Z. Ferns* (1882) 73; *Field N.Z. Ferns* (1890) 116, t. 6, f. 6; *Cheesem. Man. N.Z. Fl.* (1906) 988.

North and South Islands: Open rocky places from the Bay of Islands to Otago, not uncommon. Sea-level to 2000 ft.

Also in temperate Australia and Tasmania. Sometimes the upper pinnae are produced into naked tips which root like the apex of the frond. This state has been described by Mr. Colenso as var. *ramosum* (Trans. N.Z. Inst. xx (1888) 228).

2. **A. Trichomanes** *Linn. Sp. Plant.* (1753) 1080.—Rhizome short, thick, fibrous, clothed at the top with linear-subulate blackish scales. Stipes 1–4 in. long, naked, dark chestnut-brown, smooth and glossy, narrowly margined above. Fronds tufted at the top of the rhizome, rigid, erect, 3–12 in. long, $\frac{1}{3}$–$\frac{2}{3}$ in. broad, linear, subcoriaceous, pinnate; rhachis red-brown, margined throughout. Pinnae 15–40 pairs, spreading, sessile or nearly so, $\frac{1}{4}$–$\frac{1}{2}$ in. long, oblong or obovate, rounded at the tip, obliquely cuneate at the base, sometimes auricled on the upper edge, margins crenate-serrate. Veins few, indistinct, oblique, forked above the middle. Sori oblique, linear-oblong, 3–6 on each side of the pinna, often confluent when old.—*Hook. Sp. Fil.* iii (1860) 136; *Hook. f. Handb. N.Z. Fl.* (1864) 371; *Hook. and Bak. Syn. Fil.* (1873) 196; *Benth. Fl. Austral.* vii (1878) 745; *Thoms. N.Z. Ferns* (1882) 73; *Field N.Z. Ferns* (1890) 110, t. 28, f. 8; *Cheesem. Man. N.Z. Fl.* (1906) 988. A. melanolepis *Col. in Trans. N.Z. Inst.* xx (1888) 227.

North Island: Auckland—Waitomo Caves and Marikopo River, *E. P. Turner!* Hawke's Bay—Kaimanawa Mountains, *Captain G. Mair!* Petane, *A. Hamilton!* Puketapu, *Colenso!* Taranaki—Mount Egmont, *T. F. C.* Wellington—Tararua Range, *Buchanan.* South Island: Not uncommon in mountainous localities throughout. Sea-level to 4000 ft.

Widely distributed in the temperate regions of both hemispheres and on high mountains in the tropics.

3. **A. adiantoides** *C. Christen. Ind. Fil.* (1905) 99.—Rhizome short, stout, creeping, more or less clothed with dark-brown scales. Stipes 6–12 in. long, dark-brown, firm, villous and paleaceous at the base and sometimes throughout. Fronds erect or pendulous, 1–3 ft. long or more, 3–7 in. broad, linear-lanceolate or lanceolate, acuminate, coriaceous, dark-green or brownish-green above, paler beneath, glabrous or deciduously paleaceous, pinnate; rhachis bristly with linear scales or almost glabrous. Pinnae 12–25 pairs, spreading, stipitate, $1\frac{1}{2}$–4 in. long, $\frac{1}{2}$–1 in. broad, lanceolate, finely acuminate, obliquely cuneate at the base, the upper edge broad and rounded or sometimes auricled, the lower edge excised, lobed or almost pinnatifid, lobes sharply incised. Veins distinct, close, erecto-patent, forked, the basal ones almost flabellate. Sori numerous, linear, obliquely diverging from the midrib, almost reaching the margin. Indusium narrow, membranous but firm.—A. falcatum *Lam. Encycl.* ii (1786) 306; *A. Rich. Fl. Nouv. Zel.* (1832) 73; *A. Cunn. Precur.* (1836) n. 187; *Raoul Choix* (1846) 47; *Hook. Sp. Fil.* iii (1860) 160; *Hook. f. Handb. N.Z. Fl.* (1864) 372; *Hook. and Bak. Syn. Fil.* (1873) 308; *Benth. Fl. Austral.* vii (1878) 746; *Thoms. N.Z. Ferns* (1882) 74; *Field N.Z. Ferns* (1890) 117, t. 21, f. 5; *Cheesem. Man. N.Z. Fl.* (1906) 989. A polyodon *Forst. f. Prodr.* (1786) n. 428; *A. Cunn. Precur.* (1836) n. 188; *Hook. f. Fl. Nov. Zel.* ii (1855) 34. A. Forsterianum *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 171. Trichomanes adiantoides *Linn. Sp. Plant.* (1753) 1098.

North and South Islands, Stewart Island, Chatham Islands: From the North Cape southwards, not uncommon in woods, often pendulous from trees. Sea-level to 2000 ft.

Also abundant in many parts of tropical Asia and Africa, the Pacific islands, and Australia. Very variable in the size and shape of the pinnae, and the extent to which they are lobed and cut.

4. **A. caudatum** *Forst. f. Prodr.* (1786) n. 432.—Rhizome short, creeping, clothed with dark-brown linear scales. Stipes 6–9 in. long, densely clothed with fibrillose scales or almost naked. Frond 1–2 ft. long, 3–8 in. broad, lanceolate or oblong-lanceolate, acuminate, coriaceous, dark-green, glabrous or deciduously villous, pinnate; rhachis bristly or almost glabrous. Pinnae 15–30 pairs, spreading, stipitate, 1½–4 in. long, ½–¾ in. broad, narrow-lanceolate, narrowed into a long acuminate point, obliquely cuneate at the base, the upper edge rounded or auricled, the lower edge excised, deeply lobed or pinnatifid, sometimes more than half-way down to the midrib, lobes sharply incised. Veins distinct, close, oblique, forked. Sori shorter than in *A. adiantoides*, in an oblique row close to the midrib of the pinnae, not nearly reaching the margin.—*Hook. Sp. Fil.* iii (1860) 152; *Hook. f. Handb. N.Z. Fl.* (1864) 372; *Hook. and Bak. Syn. Fil.* (1873) 209; *Thoms. N.Z. Ferns* (1882) 75; *Field N.Z. Ferns* (1890) 118; *Cheesem. Man. N.Z. Fl.* (1906) 989.

Kermadec Islands: Sunday Island, not uncommon, *McGillivray, T. F. C., W. R. B. Oliver!*

A widely spread plant, found in most tropical regions. Doubtfully distinct from *A. adiantoides*, from which it chiefly differs in the narrower and more caudate pinnae and shorter sori.

5. **A. obtusatum** *Forst. f. Prodr.* (1786) n. 430.—Rhizome short, thick, often forming a hard rounded mass, densely clothed with large brown shining ovate-lanceolate scales. Stipes 2–6 in. long, erect, very stout, almost fleshy, greyish-green, densely scaly at the base. Fronds 2–12 in. long without the stipes, 1–3 in. broad, linear-oblong, acute, very thick and coriaceous or almost cartilaginous, glabrous or slightly paleaceous when young, pinnate; rhachis broad, often margined, channelled above. Pinnae 6–20 pairs, close-set, often overlapping, shortly stipitate, ¾–1½ in. long, ⅓–¾ in. broad, oblong or linear-oblong, obtuse and rounded at the apex, the terminal pinna alone acute, obliquely truncate-cuneate at the base; margins thick and cartilaginous, crenate-serrate. Veins obscure, simple or forked. Sori oblique to the midrib, usually copious, short, linear-oblong or linear, not reaching the margin.—*A. Cunn. Precur.* (1836) n. 191; *Raoul Choix* (1846) 37; *Homb. et Jacq. Voy. au Pôle Sud* (1852) *Crypt.* t. 1, f. B, *small specimen; Hook. Sp. Fil.* iii (1860) 96; *Hook. f. Fl. Nov. Zel.* ii (1855) 33; *Handb. N.Z. Fl.* (1864) 371; *Hook. and Bak. Syn. Fil.* (1873) 207; *Benth. Fl. Austral.* vii (1878) 747; *Thoms. N.Z. Ferns* (1882) 73; *Field N.Z. Ferns* (1890) 118, *excl. all varieties quoted; Cheesem. Man. N.Z. Fl.* (1906) 990.

Kermadec Islands: Abundant on maritime rocks, *McGillivray, T. F. C., Miss Shakespear!* North and South Islands: On maritime rocks and outlying islands from the Three Kings Islands and the North Cape to Foveaux Strait, but often local or absent from wide stretches of the coast. Chatham Islands, Stewart Island, Auckland and Campbell Islands, Antipodes Island: Apparently not uncommon near the sea.

A. obtusatum is here restricted to Forster's original plant, which appears to be purely littoral. It has a wide range outside New Zealand, being found in Australia and Tasmania, several of the Pacific islands, Juan Fernandez, the coasts of extra-tropical South America, Tristan d'Acunha, and Possession Island.

6. **A. lucidum** *Forst. f. Prodr.* (1786) n. 427.—Rhizome short, stout, often forming a hard and woody rounded caudex, clothed at the top with large brown shining ovate-acuminate scales. Stipes 6–18 in. long,

stout, terete or compressed, densely scaly at the base. Fronds 1–3 ft. long without the stipes, 6–14 in. broad, erect or pendulous, lanceolate to ovate-lanceolate or oblong-lanceolate, acuminate, dark-green and glossy, herbaceous or subcoriaceous, glabrous or slightly paleaceous beneath, pinnate ; rhachis terete or compressed. Pinnae 6–20 pairs, remote or rather close, stipitate, 2–6 in. long, $\frac{3}{4}$–2 in. broad, lanceolate to oblong-lanceolate or elliptic-ovate, usually narrowed into a long acuminate point, often caudate, obliquely cuneate at the base, the upper edge rounded, the lower cut away ; margins somewhat thickened, sinuate-serrate ; veins usually evident, forked. Sori oblique to the midrib, very numerous, close, linear-elongate.—*A. Cunn. Precur.* (1836) n. 189 ; *Raoul Choix* (1846) 37 ; *Hook. Sp. Fil.* iii (1860) 98 ; *Hook. f. Fl. Nov. Zel.* ii (1855) 33 ; *Handb. N.Z. Fl.* (1864) 371 ; *Cheesem. Man. N.Z. Fl.* (1906) 990. A. obtusatum *var.* lucidum *Hook. and Bak. Syn. Fil.* (1873) 207 ; *Benth. Fl. Austral.* vii (1878) 747 ; *Thoms. N.Z. Ferns* (1882) 74 ; *Field N.Z. Ferns* (1890) 119, t. 13, f. 6.

Var. **obliquum** *Moore Ind. Fil.* (1859) 142.—Fronds smaller and more coriaceous, 12–18 in. long. Pinnae more closely placed, 1–3 in. long, oblong-lanceolate, acute but not acuminate. Sori shorter. Approaches *A. obtusatum.*—*A.* obliquum *Forst. f. Prodr.* (1786) n. 429. A. apice-dentatum *Homb. et Jacq. Voy. au Pôle Sud* (1852) *Crypt.* t. 1A, *and* A. obtusatum t. 1B (*large specimen*). A. obtusatum *var.* obliquum *Hook f. Fl. Antarct.* i (1844) 108 ; *Fl. Nov. Zel.* ii (1855) 33 ; *Handb. N.Z. Fl.* (1864) 371 ; *Hook. Sp. Fil.* iii (1860) 96 ; *Hook. and Bak. Syn. Fil.* (1873) 207.

Var. **Lyallii** *Hook. f. Fl. Nov. Zel.* ii (1855) 33, t. 77.—Size and habit of the type ; but the inferior pinnae lanceolate-deltoid, cut down to the rhachis in the lower part into distinctly stipitate pinnules ; intermediate pinnae more or less deeply lobed, especially on the upper margin, lobes crenate.—*Handb. N.Z. Fl.* (1864) 371 ; *Hook Sp. Fil.* iii (1860) 99. A. Lyallii *Moore Ind. Fil.* (1859) 143.

Kermadec Islands, North and South Islands, Chatham Islands, Stewart Island, Auckland and Campbell Islands, Antipodes Island : The typical form widely distributed in lowland districts as far south as Stewart Island. Var. *obliquum* from the North Cape to Campbell Island. Var. *Lyallii :* In various localities from Mangonui (*H. Carse !*) and the Bay of Islands (*Miss Clarke !*) to Otago, but rare and local, and always in small quantity. Chatham Islands, *Field, Miss Seddon !*

In the "Synopsis Filicum" *A. lucidum*, together with *A. obliquum*, was reduced to the position of a variety of *A. obtusatum*. This view was accepted by many pteridologists, mainly, I presume, on account of the undoubted fact that the three plants are more or less connected by transitional forms. But *A. scleropium* also connects *A. lucidum* with *A. flaccidum*, while var. *Lyallii* offers a passage to *A. bulbiferum*, so that by parity of reasoning these species should also be included. This reduction was actually proposed by the late Baron Mueller in his Chatham Island Florula (p. 66), but has found no followers. As arbitrary distinctions must in any case be employed, and as the differences between the typical *A. lucidum* and *A. obtusatum* are quite as well marked as those between several species of *Asplenium* universally admitted, I retained both species in the first edition of this work. Since then further consideration and the examination of extensive suites of specimens have still further strengthened this view ; and I am now of opinion that *A. scleropium* should also be restored to specific rank, as well as Colenso's *A. anomodum*. *A. obliquum* has generally been placed with *A. obtusatum ;* but its position is really a matter of taste ; and it seems to fall more naturally under *A. lucidum*.

A. lucidum has been recorded from Norfolk Island and Lord Howe Island. But it is not enumerated in the recent lists of Laing and Oliver, and its occurrence may therefore be doubted.

7. **A. scleroprium** *Homb. et Jacq. Voy. au Pôle Sud* (1852) *Crypt.* t. 1D. —Rhizome short, thick, densely covered with dark-brown scales. Stipes 4–8 in. long, broad, flattened or furrowed in front. Fronds 1–1½ ft. high, 5–10 in. broad, linear-lanceolate to oblong-lanceolate, very fleshy and

coriaceous, bright shining-green, pinnate. Pinnae 8–15 pairs, rather closely placed, petiolate, 3–5 in. long, $\frac{1}{2}$–$\frac{3}{4}$ in. broad, narrow-lanceolate, obliquely cuneate at the base, caudate-acuminate at the tip, closely and deeply serrate or pinnatifid. Segments linear or linear-oblong, entire or sometimes bifid at the tip. Sori linear, often extending into the segments, much nearer the margin than the costa. Indusium broad, rigid.—*Hook. f. Fl. Antarct.* i (1844) 109; *Handb. N.Z. Fl.* (1864) 371; *Hook. Sp. Fil.* iii (1860) 97. A. flaccidum *var.* aucklandicum *Hook. f. Fl. Antarct.* i (1844) 109. A. lucidum *var.* scleroprium *Moore Ind. Fl.* (1857–62) 142; *Cheesem. Man. N.Z. Fl.* (1906) 991.

Stewart Island: Not common. Paterson Inlet, Port Pegasus, Wilson Bay, *Cockayne;* Herekopere Island, *T. Kirk!* Small islands off Stewart Island, *Poppelwell.* Auckland Islands: Abundant on the margin of woods near the sea, *Hooker! and many others.*

In the first edition of this work I treated *A. scleroprium* as a transition from *A. lucidum* into *A. flaccidum*, and no doubt there is much to be said for this view. But its usual appearance is so distinct from both *A. flaccidum* and *A. lucidum* that I now consider the better course is to treat it as a separate species.

8. **A. anomodum** *Col. in Trans. N.Z. Inst.* xv (1882) 309.—Rhizome short and stout, globose or ovoid, 1 in. in diam., densely clothed with lanceolate or ovate-lanceolate shining and reticulate blackish-brown scales. Stipes 1$\frac{1}{2}$–6 in. long, sparingly paleaceous. Fronds 1$\frac{1}{2}$–10 in. long without the stipes, 1–4 in. broad, ovate-lanceolate to oblong-lanceolate or oblong, pale greyish-green, subcoriaceous, slightly paleaceous beneath, in small specimens pinnate, in larger bipinnatifid. Pinnae 4–8 pairs with a terminal one, very variable in size and shape, in small specimens $\frac{3}{4}$–1 in. long, oblong, obtuse, crenate or slightly lobed; in larger ones 2–5 in. long, lanceolate or ovate-lanceolate, petiolate, acute or acuminate, deeply lobed or pinnatifid at the base, crenate or serrate above; veins evident, forked. Sori short, linear-oblong to narrow-linear, inclined to the costa of the pinna. Indusium pale whitish-green, thin and membranous.—A. lucidum *var.* anomodum *Cheesem. Man. N.Z. Fl.* (1906) 991.

North and South Islands: Usually in limestone districts. Hawke's Bay—Petane, *A. Hamilton!* Te Aute, *C. P. Winkelmann!* Norsewood, *Colenso!* Takapau, *J. Stewart.* Nelson—Wangapeka Valley and Mount Arthur Plateau, ascending to nearly 4000 ft., *T. F. C.*

If *A. Hookerianum* is to be separated from *A. bulbiferum*, and *A. Richardi* from *A. flaccidum*, then the rank of a species should not be refused to this curious little plant. Although allied to *A. lucidum* var. *Lyallii*, it is quite distinct in the size, shape, and cutting of the frond.

9. **A. Hookerianum** *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 169.—Rhizome short, stout, rounded, emitting numerous fibrous roots, clothed at the top with subulate-lanceolate brownish scales. Stipes 1–4 in. long or more, greenish or greenish-grey, more or less clothed with deciduous scales, becoming almost glabrous when old. Fronds tufted at the top of the rhizome, spreading, 2–10 in. long without the stipes, 1–4 in. broad, oblong-lanceolate to broadly ovate or ovate-deltoid, acuminate, dark-green, herbaceous or almost membranous, pinnate or bipinnate; rhachis and under-surface more or less scaly. Pinnae 4–12 pairs, the largest 1–3 in. long, distinctly stipitate, pinnate, or in small specimens pinnatifid or deeply lobed. Pinnules rather remote, on long slender petioles, usually rounded or rhomboid with a cuneate base, more rarely narrower and

cuneate-oblong, irregularly toothed or lobed or even pinnatifid, rarely again pinnate. Veins subflabellate, forked. Sori 2–5 on a pinnule, short, oblong, remote from the margin.—*Hook. Sp. Fil.* iii (1860) 194; *Moore Ind. Fil.* (1858) 136; *Hook. f. Handb. N.Z. Fl.* (1864) 372; *Hook. and Bak. Syn. Fil.* (1873) 214; *Benth. Fl. Austral* vii (1878) 747; *Thoms. N.Z. Ferns* (1882) 75; *Field N.Z. Ferns* (1890) 120, t. 16, f. 4A; *Cheesem. Ill. N.Z. Fl.* ii (1914) t. 243. A. adiantoides *Raoul Choix* (1846) 10, t. 1 (*not of Raddi*). A. adiantoides *var.* Hookerianum *Hook. f. Fl. Nov. Zel.* ii (1855) 35. A. Raouli *Mett. Aspl.* (1859) 118. A. ornatum *Col. in Trans. N.Z. Inst.* xxii (1890) 452.

Var. **Colensoi** *Moore Ind. Fil.* (1858) 137.—Fronds pale-green, usually flaccid. Pinnules on shorter stalks, deeply and finely pinnatifid; segments linear, each with a single vein. Sori oblong, solitary on the margin of the segments.—*Hook. f. Handb. N.Z. Fl.* (1864) 373; *Thoms. N.Z. Ferns* (1882) 75; *Field N.Z. Ferns* (1890) 120, t. 27, f. 1. A. Colensoi *Hook. f. in Lond. Journ. Bot.* iii (1844) 26; *Hook. and Bak. Syn. Fil.* (1873) 219. A. adiantoides *var.* Colensoi *Hook. f. Ic. Plant.* t. 984; *Fl. Nov. Zel.* ii (1855) 35. A. Richardi *var.* Colensoi *Hook. Sp. Fil.* iii (1860) 197.

North and South Islands: From Mangonui and Kaitaia to the south of Otago, but often local. Sea-level to 2500 ft.

A variable little plant, said to be found also in New South Wales and Victoria, but I have seen no specimens from thence. Var. *Colensoi* was placed with *A. Richardi* by Sir W. J. Hooker, and is retained as a distinct species by Mr. Baker in the "Synopsis Filicum." But, as stated by Mr. Field (N.Z. Ferns, 120), it often grows intermixed with the type, and occasionally the fronds of both forms can be found on the same plant. Mr. Colenso's *A. ornatum* is simply a state with the pinnules rather narrower than usual, and on longer stalks.

10. **A. bulbiferum** *Forst. f. Prodr.* (1786) n. 433.—Rhizome short, stout, erect or oblique, crowned with linear-subulate scales. Stipes 4–12 in. long or more, compressed or semiterete, usually dark-brown and densely scaly at the base, above green or greyish-green and either naked or deciduously scaly. Fronds 1–4 ft. long, 6–12 in. broad, ovate-lanceolate or oblong-lanceolate, acuminate, bright-green, scarcely membranous but flaccid, 2–3-pinnate or in small specimens pinnate; rhachis compressed, often scaly when young. Primary pinnae numerous, horizontal, 3–6 in. long, 1–1½ in. broad, lanceolate or ovate-lanceolate, acuminate, often proliferous on the upper surface, cut down to a narrowly winged rhachis into numerous secondary divisions or pinnules. Pinnules ½–1½ in. long, lanceolate to ovate-oblong, deeply pinnatifid; ultimate segments linear-oblong, entire or toothed. Sori short, oblique, oblong, on the disc of the shortly lobed pinnules, but often marginal on the segments of the more deeply divided ones.—*A. Rich. Fl. Nouv. Zel.* (1832) 75; *A. Cunn. Precur.* (1836) n. 193; *Raoul Choix* (1846) 38; *Hook. Ic. Plant.* t. 423; *Sp. Fil.* iii (1860) 196; *Homb. et Jacq. Voy. au Pôle Sud* (1852) *Crypt.* t. 3, f. 1; *Hook. f. Fl. Nov. Zel.* ii (1855) 34; *Handb. N.Z. Fl.* (1864) 373; *Hook. and Bak. Syn. Fil.* (1873) 218; *Benth. Fl. Austral.* vii (1878) 748; *Thoms. N.Z. Ferns* (1882) 75; *Field N.Z. Ferns* (1890) 121, t. 6, f. 5; *Cheesem. Man. N.Z. Fl.* (1906) 993.

Var. **laxum** *Hook. f. Fl. Nov. Zel.* ii (1855) 34.—Fronds smaller and more slender, with narrower and more remote pinnae. Pinnules more deeply divided; segments narrow-linear. Sori often marginal.—*Handb. N.Z. Fl.* (1864) 373; *Hook. Sp. Fil.* iii (1860) 196; *Hook. and Bak. Syn. Fil.* (1873) 218. A. laxum *R. Br. Prodr.* (1810) 151; *Homb et Jacq. Voy. au Pôle Sud* (1852) *Crypt.* t. 3, f. 3. A. gracillimum *Col. in Trans. N.Z. Inst.* xxii (1890) 453. (?) A. triste *Raoul Choix* (1846) 10.

Var. **tripinnatum** *Hook. f. Fl. Nov. Zel.* ii (1855) 34.—Fronds ample, tripinnate, with narrow pinnules and segments resembling some forms of *A. flaccidum*, but more compound and texture thinner. Sori marginal on the segments.—*Handb. N.Z. Fl.* (1864) 373; *Hook. Sp. Fil.* iii (1860) 196. A. tremulum *Homb. et Jacq. Voy. au Pôle Sud* (1852) *Crypt*, t. 3, bis.

North and South Islands, Chatham Islands, Stewart Island, Antipodes Island: Abundant throughout, especially in damp woods. Sea-level to 3000 ft. *Moku.*

The typical state of *A. bulbiferum* is a well-known plant throughout the whole of New Zealand, and is at once distinguished from the other species of the genus by the ample dark-green bipinnate fronds with comparatively broad pinnules, and especially by its habit of producing small bulbils on the upper surface of the frond, which develop into young plants while still attached to the frond. When the bulbils are not developed, and the frond is more slender, with narrower and more deeply divided pinnules, so that the sori are often almost marginal, the plant becomes var. *laxum*. This runs into several small states not clearly separable, one of which is the *A. triste* of Raoul, and another Colenso's *A. gracillimum*. Var. *tripinnatum* has still narrower pinnules, deeply cut into narrow-linear segments, and the sori are quite marginal. It approaches very close to some states of *A. flaccidum*, but the frond is broader and more decompound, and the texture is thinner. In addition to the above varieties there are a large number of puzzling forms, which apparently connect the species with *A. falcatum*, *A. lucidum* var. *Lyallii*, *A. scleroprium*, *A. Hookerianum*, *A. Richardi*, and *A. flaccidum*. In Stewart Island, passage forms into *A. scleroprium* and *A. flaccidum* are particularly abundant, and it is often difficult to decide to which species they should be referred. It would occupy many pages to characterize these, and I doubt whether it is possible to define them in language sufficiently precise to enable them to be recognized with certainty.

A. bulbiferum in some of its forms is also found in Australia and Tasmania, many of the Pacific islands, Malaya, and North India.

11. **A. Richardi** *Hook. f. Fl. Nov. Zel.* ii (1855) 35.—Rhizome short, stout, usually forming a rounded knot-like caudex, clothed at the top with dark-brown subulate scales. Stipes tufted at the top of the rhizome, 2–6 in. long, stout, rigid, erect, greenish, usually clothed with linear scales, rarely almost glabrous. Fronds 3–9 in. long without the stipes, 1–4 in. broad, ovate or ovate-lanceolate, acuminate, dark-green, varying from almost membranous to coriaceous, somewhat rigid, 2–3-pinnate; rhachis smooth or bristly. Primary pinnae 8–12 pairs, rather close, stipitate, $\frac{1}{2}$–2 in. long, ovate-lanceolate to ovate; secondary crowded, often overlapping, ovate-rhomboid, pinnatifid or again pinnate. Ultimate segments $\frac{1}{12}$–$\frac{1}{8}$ in. long, narrow-linear, obtuse or acute or mucronate, each with a single vein. Sori short, broad, oblong, on the margins of the segments.—*Handb. N.Z. Fl.* (1864) 373; *Hook. Sp. Fil.* iii (1860) 197, *excl. var.* Colensoi; *Hook. and Bak. Syn. Fil.* (1873) 222; *Thoms. N.Z. Ferns* (1882) 76; *Field N.Z. Ferns* (1890) 124, t. 28, f. 5; *Cheesem. Man. N.Z. Fl.* (1906) 994. A. adiantoides *var.* Richardi *Hook. f. Ic. Plant.* t. 977. A. Raoulii *var.* Richardi *Mett. Aspl.* (1859) 118. A. symmetricum *Col. in Trans. N.Z. Inst.* xxxi (1899) 254.

North Island: Slopes of Ruapehu, *W. Townson!* Tararua Range, *Buchanan, H. C. Field.* South Island: Not uncommon in hilly and mountainous districts throughout. Sea-level to 4000 ft.

A very puzzling plant. Small states with membranous fronds appear to pass directly into *A. Hookerianum* var. *Colensoi*, while larger and more coriaceous forms only differ from erect states of *A. flaccidum* in the more finely cut fronds and smaller segments.

12. **A. flaccidum** *Forst. f. Prodr.* (1786) n. 426.—Rhizome short, stout, erect, clothed at the top with copious dark-brown subulate-lanceolate scales. Stipites tufted at the top of the rhizome, usually rather short,

compressed or angled, greenish, scaly at the base, naked above. Fronds very variable in size and shape, 3 in. to 3 ft. long or more, 2–9 in. broad, the long-fronded varieties lanceolate or oblong-lanceolate, the shorter ones ovate or broadly ovate, acuminate, thick and coriaceous, flaccid and pendulous or rigid and erect, pale-green, quite glabrous, pinnate or bipinnate. Pinnae remote or rather close, 2–10 in. long, $\frac{1}{4}$–$\frac{3}{4}$ in. broad, in the pendulous varieties narrow-linear to lanceolate, but in the small erect forms often much broader, acuminate or caudate, usually cut down to a narrowly winged rhachis into erecto-patent straight or incurved linear-oblong obtuse or acute lobes $\frac{1}{4}$–$\frac{2}{3}$ in. long; or more rarely the pinnae are again pinnate at the base, with the secondary divisions lobed or pinnatifid. Veins indistinct, a single one to each lobe. Sori oblong, usually on the margins of the lobes, rarely on the disc of the pinnae.—*Hook. Sp. Fil.* iii (1860) 205; *Hook. f. Fl. Nov. Zel.* ii (1855) 35; *Handb. N.Z. Fl.* (1864) 374; *Hook. and Bak. Syn. Fil.* (1873) 223; *Benth. Fl. Austral.* vii (1878) 749; *Thoms. N.Z. Ferns* (1882) 76; *Field N.Z. Ferns* (1890) 123, t. 12, f. 2; *Cheesem. Man. N.Z. Fl.* (1906) 994. A. heterophyllum *A. Rich. Fl. Nouv. Zel.* (1832) 74. Coenopteris flaccidum *Thunb. Nov. Act. Petr.* ix (1795) 158, t. D., f. 1, 2; *A. Cunn. Precur.* (1836) n. 194; *Raoul Choix* (1846) 38. C. novae-zealandiae *Spreng. in Schrad. Journ.* (1799) 269; *Raoul Choix* (1846) 38. Darea flaccida *Willd. Sp. Plant.* v (1810) 295.

Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands, Auckland Islands: Abundant throughout. Sea-level to 3500 ft.

Also found in Australia and Tasmania, in several of the Pacific islands, and said to have been gathered in South Africa. In New Zealand it varies excessively, the varieties depending to a large extent on the nature of their habitat, specimens growing on trees in damp forests being long and narrow and pendulous, while those found on exposed rocks are broad, rigid, and erect. Sir J. D. Hooker makes 5 varieties in the Handbook, but they are so intimately connected by intermediate forms that it is difficult to provide them with satisfactory definitions.

13. **A. Shuttleworthianum** *Kunze Farrnkr.* i (1840) 26, t. 14.—Rhizome short, tufted. Fronds very variable in size, 1–3 ft. including the stipes, erect or pendulous, broadly ovate or ovate-oblong, acuminate, 3–4-pinnate, glabrous, coriaceous, yellowish-green; inferior pinnae subopposite, somewhat remote; superior alternate, more closely placed, all narrowed into acuminate points; secondary pinnae lanceolate, pinnatifid or again pinnate; ultimate segments very narrow, expanded at the tip to support the sorus, and thus becoming linear-spathulate. Sori copious, very small, mostly solitary and marginal on the segments.—*Mett. Aspl.* (1859) 109; *Hook. Sp. Fil.* iii (1860) 211; *Moore Ind. Fil.* (1860) 168. A. flaccidum *var.* Shuttleworthianum *Hook. f. Handb. N.Z. Fl.* (1864) 374; *Cheesem. Man. N.Z. Fl.* (1906) 995.

Kermadec Islands: Sunday Island, not uncommon on coastal and inland rocks, *McGillivray, T. F. C., Oliver!*

A very handsome and conspicuous species, quite unlike any form of *A. flaccidum*, to which it was reduced by Sir J. D. Hooker. It was discovered on Pitcairn Island by Mr. Cuming, but has since been found in the Samoan Group and elsewhere in Polynesia.

19. **BLECHNUM** Linn.

(Subgenus **Lomaria** Willd.)

Rhizome creeping or short and suberect, sometimes lengthened into a short caudex, rarely long and climbing. Fronds variable in size, usually

simply pinnate or pinnatifid, rarely undivided, very rarely bipinnate, dimorphic; the outer fronds sterile with large and broad flat pinnae, the inner fertile with smaller linear pinnae. Veins free, not anastomosing. Sori linear, in a continuous elongated line occupying the whole space between the midrib and the margin. Indusium linear, membranous, composed of the more or less modified edge of the frond, at first revolute over the sorus, ultimately spreading. Sporangia stalked, girt by an incomplete vertical ring, bursting transversely.

The above description is that of *Lomaria*, the group to which the New Zealand species belong. But *Blechnum* and *Lomaria* only differ from one another in the fact that in *Blechnum* there is an evident interspace between the margin of the frond and the sori, whereas in *Lomaria* there is no such interspace, the sori occupying the whole space between the midrib and the margin. This difference is now not considered to be of generic importance; and pteridologists have transferred the whole of the *Lomariae* to *Blechnum;* a course which I have adopted in this work.

A large group of nearly 50 species, most abundant in the South Temperate Zone, but with outlying species in most temperate and tropical countries. Of the 14 species found in New Zealand, 4 or perhaps 5 are endemic, 2 are widely distributed in the South Temperate Zone, the remainder are found either in Australia or the Pacific islands, or in both.

A. Fronds pinnate or pinnatifid, rarely simple.

* Sterile fronds pinnatifid (or rarely simple), central and lower pinnae connected by their dilated bases.

Fronds 1–3 ft. long, often pendulous, broad, coriaceous, sometimes simple. Pinnae few, large, 4–12 in. long, 1–1½ in. broad .. 1. *B. Patersoni.*

Fronds 1–4 ft. high, narrow, erect. Pinnae very numerous, 1–3 in. × ¼–½ in., reddish or dirty-white beneath .. .. 2. *B. discolor.*

** Sterile fronds pinnatifid above, pinnate below, central and lower pinnae free, but more or less dilated at their bases.

a. Pinnae at the base of the frond not reduced in size.

Fronds 4–14 in., lanceolate-deltoid. Pinnae 1–3 in., lanceolate or ensiform, the lowest pair often deflexed .. .. .. 3. *B. vulcanicum.*

b. Pinnae gradually reduced in size towards the base of the frond.

Fronds 1–3 ft. × 3–6 in., submembranous. Pinnae 1½–3 in. × ⅓–⅔ in., lanceolate, falcate, acuminate. Pinnae of fertile fronds 2–3 in. long .. .. 4. *B. Norfolkianum.*

Fronds 6–18 in. × 2–4 in., submembranous. Pinnae 1–2 in. × ¼–½ in., oblong-lanceolate, obtuse or acute, sinuate-crenate. Pinnae of fertile fronds ¾–1½ in., narrow-linear, acute .. 5. *B. lanceolatum.*

Fronds 9–30 in. × 1½–4 in., fleshy or coriaceous. Pinnae ¾–2½ in. × ¼–½ in., linear-oblong to lanceolate, entire. Pinnae of fertile fronds ¾–1½ in., linear-oblong, obtuse .. .. .. 6. *B. durum.*

Rhizome short. Fronds 4–12 in. × ½–1 in., dark-green, coriaceous. Pinnae ⅓–½ in. × ¼ in., oblong to suborbicular. Fertile fronds shorter than the sterile .. .. 7. *B. Banksii.*

Rhizome creeping. Fronds 2–12 in. × ⅓–⅔ in., coriaceous to submembranous. Pinnae ⅕–⅓ in., ovate-oblong to linear-oblong. Fertile fronds longer than the sterile; pinnae linear-oblong, obtuse .. .. 8. *B. penna-marina.*

*** Sterile fronds pinnate, or pinnatifid above; pinnae not dilated at their bases.

Rhizome short, thick. Fronds often very large, 1–8 ft. long. Pinnae 3–12 in. × ½–1 in., linear, coriaceous .. .. 9. *B. capense.*

Rhizome very long, climbing. Sterile fronds dimorphic; lower with small rounded pinnae; upper with long lanceolate falcate ones .. .. 10. *B. filiforme.*

Rhizome short, suberect. Fronds 3–8 in. × 1–1½ in., blackish-green, lyrate-pinnatifid. Terminal pinnae much longer than the lateral .. .. 11. *B. nigrum.*

Rhizome stout, suberect. Fronds 12–30 in. × ¾–1½ in., linear, membranous; rhachis and stipes bristly and scaly. Pinnae ½–¾ in. × ¼–⅓ in., oblong to suborbicular, obtuse .. .. 12. *B. fluviatile.*

Rhizome short, suberect. Fronds 3–10 in. × ¾–1½ in., submembranous; stipes and rhachis naked. Pinnae ½–¾ in., ovate-oblong to oblong, obtuse .. .. 13. *B. membranaceum.*

B. Fronds bipinnate.

Rhizome often produced into a caudex resembling the trunk of a miniature tree-fern. Fronds 9–18 in. long, ovate, acuminate .. .. 14. *B. Fraseri.*

1. **B. Patersoni** *Mett. Fil. Lips.* (1856) 64; *var.* elongata *Hook. and Bak. Syn. Fil.* (1873) 174.—Rhizome short, stout, creeping, clothed with blackish-brown scales, sometimes stoloniferous; rootlets tomentose. Stipes 3–9 in. long, stout, black, scaly at the base. Sterile fronds very variable; of young plants (and occasionally of old ones) quite simple and entire, 6–12 in. long, 1–1½ in. broad; of old plants pinnatifid, 1–3 ft. long or more, 6–12 in. broad, broadly ovate to ovate-lanceolate, erect or pendulous, coriaceous, glabrous, dark-green above, paler beneath; rhachis winged throughout. Pinnae 4–12 on each side, alternate, acuminate, broadly decurrent at the base, forming a rounded lobe in the sinus, quite entire; at the base of the frond there are usually several small rudimentary pinnae sometimes extending down the stipes almost to its base. Veins numerous, close, free, forked. Fertile fronds as long as the sterile, pinnatifid; pinnae narrow-linear, 4–10 in. long, ⅛–¼ in. broad. Sori continuous, ultimately covering the whole under-surface except the costa.—Lomaria Patersoni *Spreng. Syst. Veg.* iv (1827) 62; *Thoms. N.Z. Ferns* (1882) 64; *Field N.Z. Ferns* (1890) 98, t. 11, f. 3, 3A, 3B; *Cheesem. Man. N.Z. Fl.* (1906) 975. L. elongata *Blume Enum.* (1828) 201; *Hook. Sp. Fil.* iii (1860) 3, t. 143; *Hook. f. Fl. Nov. Zel.* ii (1855) 29; *Handb. N.Z. Fl.* (1864) 367. L. heterophylla *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 175 (*not of Desv.*). L. Colensoi *Hook. f. Ic. Plant.* (1844) t. 627, 628.

North and South Islands, Stewart Island: Damp hilly forests from the Thames and Te Aroha southwards, not common; local on the east side of the South Island. Sea-level to 3000 ft.

The New Zealand variety is also found in the Pacific islands, Malaya, and India. The typical state, which differs in the fronds being usually simple, occurs in Australia, Tasmania, and the Philippines. As in most of the species of the genus, the fronds are sometimes partly fertile and partly sterile.

2. **B. discolor** *Keys. Polyp.* (1873) 66.—Rhizome short, stout, suberect, stoloniferous at the base, often lengthened above into a short erect caudex 1–2 ft. high, clothed at the top with the bases of the old stipites. Stipes 3–6 in. long, stout, polished, densely covered at the base with dark-brown linear scales. Fronds numerous, tufted at the top of the caudex and forming an elegant crown, erect, 1–4 ft. high; sterile linear-lanceolate to oblong-lanceolate, gradually tapering at both ends, 2–6 in. broad in the middle, coriaceous, glossy-green above, dirty-white to reddish-brown beneath, often clothed with rufous scales when young, glabrous when old, deeply pinnatifid or pinnate at the very base. Pinnae very numerous, closely placed, horizontally spreading, 1–3 in. long, ¼–½ in. broad, linear

to linear-oblong, subacute, usually connected by their broad dilated bases, margins minutely sinuate. Veins close, free, forked. Fertile fronds about as long as the sterile but narrower; pinnae ¾–1½ in. long, linear, stout, often flexuous, usually with broad leafy bases. Sori continuous, covering the whole under-surface except the costa. Indusium with the margins much lacerated.—Lomaria discolor *Willd. Sp. Plant.* v (1810) 293; *A. Cunn. Precur.* (1836) n. 181; *Raoul Choix* (1846) 37; *Hook. Sp. Fil.* iii (1860) 5; *Hook. f. Fl. Nov. Zel.* ii (1855) 30; *Handb. N.Z. Fl.* (1864) 368; *Hook. and Bak. Syn. Fil.* (1873) 175; *Benth. Fl. Austral.* vii (1878) 735; *Thoms. N.Z. Ferns* (1882) 65; *Field N.Z. Ferns* (1890) 100, t. 4, f. 2, 2A; *Cheesem. Man. N.Z. Fl.* (1906) 976. Stegania discolor *A. Rich. Fl. Nouv. Zel.* (1832) 87. Onoclea discolor *Swartz Syn. Fil.* (1806) 3. Osmunda discolor *Forst. f. Prodr.* (1786) n. 413.

North and South Islands, Chatham Islands, Stewart Island, Auckland and Campbell Islands: Abundant in open forests throughout. Sea-level to 3000 ft.

Easily distinguished by the tall erect habit, long and narrow horizontally spreading pinnae, and dirty-white or reddish under-surface. The fronds are frequently forked at the top, and a beautiful sport is in cultivation in which the pinnae are greatly expanded in the upper two-thirds of their length, and deeply pinnatifid. Also a native of Norfolk Island, Australia, and Tasmania.

3. **B. vulcanicum** *Kuhn Ann. Lugd. Bat.* iv (1869) 284.—Rhizome short, stout, woody, erect or inclined, densely clothed with the remains of the old stipites. Stipes 4–9 in. long, slender, pale yellow-brown, clothed towards the base with dark-brown shining subulate scales, smooth and polished above. Sterile fronds 4–14 in. long without the stipes, 2–5 in. broad at the base, lanceolate-deltoid, not narrowed below, acuminate, coriaceous, dull-green, glabrous or the surfaces and margins sprinkled with soft white hairs, pinnate at the base, pinnatifid above. Pinnae 1–3 in. long, ¼–⅓ in. broad, spreading, lanceolate or ensiform, broadest at the base, acute or obtuse at the tip, falcate, lowest pair deflexed; margins thickened, entire or minutely crenate-undulate. Veins free, forked. Fertile fronds usually exceeding the sterile and with a longer stipes, pinnate in the lower half; pinnae 1–2 in. long, linear, distant, with a dilated adnate base. Sori continuous; indusium with lacerate margins.—Lomaria vulcanica *Blume Enum.* (1828) 202; *Hook. Ic. Plant.* t. 969; *Sp. Fil.* iii (1860) 12; *Hook. f. Fl. Nov. Zel.* ii (1855) 29; *Handb. N.Z. Fl.* (1864) 367; *Hook. and Bak. Syn. Fil.* (1873) 176; *Benth. Fl. Austral.* vii (1878) 735; *Thoms. N.Z. Ferns* (1882) 65; *Field N.Z. Ferns* (1890) 99, t. 27, f. 5, 5A; *Cheesem. Man. N.Z. Fl.* (1906) 977. L. deltoides *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 177. L. deflexa *Col. l.c.* 178. L. paucijuga *Col. in Trans. N.Z. Inst.* xx (1888) 222.

North and South Islands, Stewart Island: In dry open woods from Auckland and Coromandel southwards, but often rare and local, especially to the north of the East Cape, more frequent in the subalpine forests of Nelson and Canterbury. Sea-level to 3500 ft.

A well-marked species, at once recognized by the narrow-deltoid frond, with the lowest pair of pinnae deflexed. It extends northwards through Australia and the Pacific islands to Malaya.

4. **B. Norfolkianum** *C. Christen. Ind. Fil.* (1905) 157.—Rhizome short, stout, erect or inclined, clothed with the bases of the old stipites mixed with dark-brown chaffy scales. Stipes short, stout, 2–4 in. long, scaly at the

base. Sterile fronds numerous, forming a crown at the top of the rhizome, erect or spreading, 1–3 ft. high, 3–6 in. broad, lanceolate or narrow elliptic-lanceolate, gradually tapering from the middle to both ends, acuminate, dark-green, firm but scarcely coriaceous, quite glabrous, deeply pinnatifid or pinnate at the base. Pinnae numerous, close-set, horizontally spreading, 1½–3 in. long, ⅓–⅔ in. broad, lanceolate, tapering from a broad adnate base to an acuminate point, subfalcate, the lower ones gradually reduced in size to minute auricles, margins crenulate; veins fine, close, forked. Fertile fronds rather shorter than the sterile, pinnate; pinnae remote, very narrow-linear, 2–3 in. long, apiculate.—Lomaria Norfolkiana *Heward in Lond. Journ. Bot.* (1842) 122; *Bak. in Ann. Bot.* v (1891) 219; *Cheesem. Man. N.Z. Fl.* (1906) 977. L. acuminata *Hook. and Bak. Syn. Fil.* (1873) 481; *Thoms. N.Z. Ferns* (1882) 66. L. attenuata *Hook. f. Handb. N.Z. Fl.* (1864) 368; *Field N.Z. Ferns* (1890) 101 (*not of Willd.*).

Kermadec Islands: Sunday Island, abundant, *McGillivray, T. F. C., Oliver!* North Island: Three Kings Islands, *T. F. C.* Little Barrier Island, *Reischek! T. F. C.*

Also in Norfolk Island. It can only be distinguished from *B. lanceolatum* by the greater size, the long acuminate sterile pinnae, and the much longer fertile pinnae, and might well be regarded as a variety only. On both the Three Kings Islands and the Little Barrier it appears to gradually merge into the ordinary state of *B. lanceolatum.*

5. **B. lanceolatum** *Sturm Enum. Pl. Chile* (1858) 25.—Rhizome short, stout, erect or inclined, rarely produced into a short caudex 3–6 in. high. Stipes 2–6 in. long, firm, erect, dark-brown at the base and clothed with subulate scales, paler and glabrous above. Fronds tufted, forming a crown at the top of the rhizome; the sterile ones 6–18 in. long, 2–4 in. broad, lanceolate, acuminate, gradually narrowed to the base, rather membranous, pale-green or dark-green, quite glabrous, pinnate below, pinnatifid above. Pinnae numerous, close-set, horizontally spreading or ascending, 1–2 in. long, ¼–½ in. broad, lanceolate or oblong-lanceolate, attached by a broad somewhat dilated base, gradually tapering to an obtuse or acute point, slightly falcate, usually sinuate-crenate towards the tip, rarely entire; veins conspicuous, free, forked. Fertile fronds usually shorter than the sterile, 1–2 in. broad, pinnate; pinnae ¾–1½ in. long, distant, narrow-linear, acute or apiculate.—Lomaria lanceolata *Spreng. Syst. Veg.* iv (1827) 62; *A. Cunn. Precur.* (1836) n. 180; *Raoul Choix* (1846) 37; *Hook. Ic. Plant.* t. 429; *Sp. Fil.* iii (1860) 11; *Hook. f. Fl. Nov. Zel.* ii (1855) 29; *Handb. N.Z. Fl.* (1864) 367; *Hook. and Bak. Syn. Fil.* (1873) 177; *Benth. Fl. Austral.* vii (1878) 735; *Thoms. N.Z. Ferns* (1882) 66; *Field N.Z. Ferns* (1890) 102, t. 11, f. 2, 2A; *Cheesem. Man. N.Z. Fl.* (1906) 976. L. aggregata *Col. in Trans. N.Z. Inst.* xx (1888) 223; *Field N.Z. Ferns* (1890) 103, t. 29, f. 7, 7A.

North and South Islands, Chatham Islands, Stewart Island: From the North Cape southwards, abundant by the margins of streams, &c. Sea-level to 2500 ft.

Also in Victoria, Tasmania, South Australia, and the Pacific islands. A variable plant. Large specimens pass into *B. Norfolkianum*, and smaller ones are sometimes difficult to separate from *B. membranaceum.*

6. **B. durum** *C. Christen. Ind. Fil.* (1905) 153.—Rhizome stout, erect, clothed with the bases of the old stipites, sometimes lengthened into a short caudex. Stipes 1–2 in. long, clothed at the base with large ovate-

lanceolate brownish scales. Fronds numerous, tufted, forming a crown at the top of the rhizome; sterile 1–2½ ft. long, 1½–4 in. broad, lanceolate, acute or acuminate, usually broadest above the middle, very gradually narrowed to the base, dark-green, fleshy or almost coriaceous, pinnatifid above, pinnate below. Pinnae numerous, close-set, often overlapping, the largest ¾–2½ in. long, ¼–½ in. broad, variable in shape, linear-oblong to lanceolate, obtuse or acute, often falcate, attached by a broad base, the upper narrower and more acute, lowermost dwarfed to rounded auricles; margins entire, slightly thickened. Veins free, forked. Fertile fronds shorter and narrower than the sterile, 1–2½ in. broad; pinnae numerous, close, linear-oblong, rigid, obtuse. Sori very copious, covering the whole under-surface. — Lomaria dura *Moore in Gard. Chron.* (1866) 290; *Hook. f. Handb. N.Z. Fl.* (1864) 748; *Hook and Bak. Syn. Fil.* (1873) 177; *Thoms. N.Z. Ferns* (1882) 66; *Field N.Z. Ferns* (1890) 104, t. 10, f. 4, 4A; *Cheesem. Man. N.Z. Fl.* (1906) 978; *Ill. N.Z. Fl.* ii (1914) t. 240. L. rigida *J. Smith Ferns Brit. and For.* (1866) 290.

South Island: Banks Peninsula, *Armstrong.* Eastern and southern coasts of Otago, not uncommon, *Petrie! Thomson, T. Kirk!* West Coast sounds, *J. D. Enys!* Jackson's Bay and Paringa Bay, Westland, *Cockayne!* Islands in Foveaux Strait, *Poppelwell.* Stewart Island and The Snares: *T. Kirk!* The Solanders: *Cockayne!* Chatham Islands: Abundant, *Chudleigh! Buchanan! Miss Seddon!* Auckland and Campbell Islands, Antipodes Island: *T. Kirk!*

A purely littoral plant, never found far from the influence of sea-spray. Easily recognized by the fleshy or coriaceous habit, the usually obtuse and entire sterile pinnae, and by the close-set broad and rigid fertile pinnae.

7. **B. Banksii** *Mett.; Diels in Pflanzenf.* Teil i, abt. iv (1902) 249.— Rhizome short, stout, woody, erect or inclined, clothed with the old stipites at the top, and with matted fibres below. Stipes short, stout, dark-coloured, furnished at the base with numerous ovate-lanceolate chaffy scales. Fronds numerous; sterile 4–12 in. high, rarely more, ½–1 in. broad, linear-lanceolate, narrowed to both ends, rather coriaceous, dark-green, sometimes with a glaucous tinge, pinnatifid above, pinnate below. Pinnae numerous, close-set, adnate by a broad base, ⅓–½ in. long, rarely more, about ¼ in. broad, broadly oblong or almost semi-orbicular, obtuse, quite entire; lower pinnae much reduced, sometimes forming a sinuated wing down to the base of the stipes. Fertile fronds usually shorter than the sterile, pinnate throughout; pinnae shorter and narrower, more distant, straight or curved. Sori copious, covering the whole under-surface. — Lomaria Banksii *Hook. f. Fl. Nov. Zel.* ii (1855) 31, t. 76; *Handb. N.Z. Fl.* (1864) 368; *Hook. Sp. Fil.* iii (1860) 17; *Hook. and Bak. Syn. Fil.* (1873) 178; *Thoms. N.Z. Ferns* (1882) 67; *Field N.Z. Ferns* (1890) 105, t. 26, f. 2, 2A; *Cheesem. Man. N.Z. Fl.* (1906) 979.

North Island: Auckland—North Cape, *Buchanan;* near Ahipara, *T. F. C., Carse!* Bay of Islands, *A. Cunningham;* Little Barrier Island, *T. Kirk! T. F. C.;* Manukau Heads, *Sinclair, Colonel Haultain!* East Cape, *Colenso!* Taranaki—White Cliffs to Cape Egmont, *Buchanan, T. F. C.* Wellington—Wellington Heads, *Field;* Cape Terawiti, *Kirk!* South Island: Marlborough—Queen Charlotte Sound, *Banks* and *Solander.* Nelson—Cape Farewell, *T. Kirk!* West Wanganui, *Kingsley.* Westland—Jackson's Bay and Paringa, *Cockayne.* Canterbury—Banks Peninsula, *Armstrong.* Otago—Not uncommon on both the East and West Coasts, *Buchanan, Petrie! Thomson, Hamilton!* Stewart Island: Paterson's Inlet, *T. Kirk.*

A well-marked plant, easily recognized by the coriaceous habit and short and broad rounded pinnae attached by a broad base. Like *B. durum*, it is a purely littoral plant, never found beyond the influence of the sea-spray.

8. **B. penna-marina** *Kuhn Fil. Afr.* (1868) 92.—Rhizome long, slender, branched, creeping, clothed with chaffy ferruginous scales. Stipes 2–6 in. long or more, slender, red-brown, smooth and polished, sparingly scaly. Fronds tufted along the rhizome; sterile shorter than the fertile, 4–18 in. long including the stipes, $\frac{1}{3}$–$\frac{2}{3}$ in. broad, often spreading or decumbent, linear or linear-lanceolate, narrowed to the base, dark-green, pinnatifid or pinnate towards the base, texture varying from thick and coriaceous to almost membranous. Pinnae numerous, close-set, short, spreading, $\frac{1}{5}$–$\frac{1}{3}$ in. long, attached by a broad base, ovate-oblong or triangular-oblong to linear-oblong, obtuse, entire or obscurely crenate. Fertile fronds erect, pinnate throughout; pinnae numerous, rather distant, shorter and narrower than the sterile, linear or linear-oblong, obtuse, spreading or deflexed or sometimes curved upwards. Sori copious, covering the whole under-surface.—Lomaria alpina *Spreng. Syst. Veg.* iv (1827) 62; *Hook. Fil. Exot.* (1823–27) t. 32; *Sp. Fil.* iii (1860) 16; *Hook. f. Fl. Antarct.* ii (1844) 393, t. 150; *Fl. Nov. Zel.* ii (1855) 30; *Handb. N.Z. Fl.* (1864) 368; *Hook. and Bak. Syn. Fil.* (1873) 178; *Benth. Fl. Austral.* vii (1878) 736; *Thoms. N.Z. Ferns* (1882) 66; *Field N.Z. Ferns* (1890) 105, t. 17, f. 5, 5A; *Cheesem. Man. N.Z. Fl.* (1906) 980. L. pumila *Raoul Choix* (1846) 9, t. 2A; *Hook. Sp. Fil.* iii (1860) 17; *Hook. f. Fl. Nov. Zel.* ii (1855) 28; *Handb. N.Z. Fl.* (1864) 367. L. linearis *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 176. L. distans *Col. in Trans. N.Z. Inst.* xxviii (1896) 615. L. parvifolia *Col. in Trans. N.Z. Inst.* xx (1888) 224. L. penna-marina *Trev. in Atti. Inst. Ven.* xiv (1869) 570. Stegania alpina *R. Br. Prodr.* (1810) 152. Blechnum alpinum *Metten. Fil. Hort. Bot. Lips.* (1856) 64. Polypodium penna-marina *Poir. Encycl.* v (1804) 520.

North and South Islands, Chatham Islands, Stewart Island, Antipodes Island, Macquarie Island: From the Upper Thames Valley and Rotorua southwards, abundant to the south of the East Cape. Sea-level to 4000 ft.

Also abundant in temperate South America, Australia, and Tasmania. Raoul's *L. pumila* differs from the type in the more membranous fronds and distinctly crenate pinnae, but is without doubt a trivial state produced by growing in an unusually sheltered and shaded locality. Specimens exactly resembling Raoul's plate can be found without any difficulty in both Islands, and can generally be traced on the spot into ordinary *B. penna-marina*. I look upon it as a form too inconstant to keep up even as a variety. *L. parvifolia* Col., of which I possess a type specimen forwarded by Mr. Colenso himself, is clearly the same, a view which is also taken by Mr. Baker (Ann. of Bot. v (1891) 220).

9. **B. capense** *Schlecht. Adumbr.* (1825) 34, t. 18.—Rhizome short, stout, often woody, erect or inclined, sometimes prostrate, clothed at the top with large chestnut-brown scales. Stipes stout, long or short, usually densely scaly at the base. Fronds numerous, very variable in size, usually from 1–4 ft., but in dry exposed places often dwarfed to a few inches, while on the sides of deep wooded ravines they are occasionally 8–10 ft. long or even more; sterile ovate or oblong-ovate to oblong-lanceolate, erect or pendulous, very coriaceous to almost membranous, bright-green to brownish-green, pinnate throughout; rhachis stout, more or less scaly, especially when young. Pinnae often very numerous, but in small specimens and in var. *minor* frequently reduced to 4–6 pairs, alternate, horizontally spreading, 3–12 in. long or more, $\frac{1}{2}$–1 in. broad, acute or acuminate, oblique at the base and cuneate or truncate or rounded-cordate or even auriculate, sessile by the midrib alone or the uppermost more or less adnate; margins minutely toothed; costae more or less scaly.

Veins free, close, parallel, usually forked at the base. Fertile pinnae very narrow-linear, distant, 3–9 in. long, $\frac{1}{8}$–$\frac{1}{4}$ in. broad, usually on separate fronds, but often mixed with sterile pinnae or the pinnae partly fertile and partly sterile. Indusium broad, membranous, lacerate.—Lomaria capensis *Willd. Sp. Plant.* v (1810) 291; *F. Muell. Veg. Chat. Is.* (1864) 72; *Benth. Fl. Austral.* vii (1878) 737. L. procera *Spreng. Syst. Veg.* iv (1827) 65; *A. Cunn. Precur.* (1836) n. 182; *Raoul Choix* (1846) 37; *Hook. Ic. Plant.* t. 427–28; *Sp. Fil.* iii (1860) 22; *Garden Ferns*, t. 53; *Hook. f. Fl. Antarct.* i (1844) 110; *Fl. Nov. Zel.* ii (1855) 27; *Handb. N.Z. Fl.* (1864) 366; *Hook. and Bak. Syn. Fil.* (1873) 179; *Thoms. N.Z. Ferns* (1882) 67; *Field N.Z. Ferns* (1890) 107, t. 2, f. 1, 1A; *Cheesem. Man. N.Z. Fl.* (1906) 980. L. latifolia *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 175. L. duplicata *Potts in Trans. N.Z. Inst.* ix (1877) 491. Stegania procera *R. Br. Prodr.* (1810) 153; *A. Rich. Fl. Nouv. Zel.* (1832) 86, t. 13. Osmunda capensis *Linn. Mant.* (1771) 306. O. procera *Forst. f. Prodr.* (1786) n. 414.

Var. **minor** *Hook. f. Fl. Nov. Zel.* ii (1855) 27.—Smaller, 1–3 ft. high, dark olive-green; fertile fronds usually exceeding the sterile. Sterile pinnae few, 4–8 pairs, short, broad, linear-oblong, the lowermost hardly shorter than the one above it, upper often adnate.—Stegania minor *R. Br. Prodr.* (1810) 153.

Kermadec Islands, North and South Islands, Chatham Islands, Stewart Island, Auckland and Campbell Islands, Antipodes Island: Abundant throughout, ascending to 4000 ft.

A very widely distributed species. From Australia and Tasmania it extends northwards to Malaya, and is common in many of the Pacific islands. In America it ranges from the south of Chile northwards to Mexico and the West Indies. It is also found in South Africa. In New Zealand it occurs in all soils and situations, and, although attaining its greatest luxuriance in deep forest ravines, is plentiful in open swamps and gullies, and even not averse to bare hillsides or the clefts of rocky peaks. At first it is difficult to believe that the small forms found in exposed places, often not more than 6 in. high, with 3–4 pairs of pinnae, can belong to the same species as the huge specimens growing on moist cliffs in shaded ravines, in which the fronds are sometimes 8–10 ft. long, with more than 40 pairs of pinnae. But every gradation of size exists, and one form can be traced directly into the other. Hooker's var. *minor* is, however, more distinct, and in some respect approaches *Blechnum vulcanicum*. It has a different habit of growth, and possibly should be maintained as a distinct species.

In nearly all the species of *Lomaria* the fertile fronds are sometimes irregularly mixed with sterile pinnae, but in none is this so commonly seen as in *B. capense*. Sometimes one side of the frond may be fertile and the opposite side sterile, or the sterile and fertile pinnae may be irregularly mixed. Or sometimes the upper half of the frond may be fertile and the lower sterile, or *vice versa*. It is also quite common for the pinnae themselves to be partly fertile and partly sterile. The frond is also occasionally once or twice dichotomously forked, constituting Mr. Potts's *Lomaria duplicata*, and sometimes the tips of the fronds are regularly crested.

10. **B. filiforme** *Ettingsh. Denkschr. Ak. Wien* (1864) 21.—Rhizome long, stout, branched, climbing up trees to a great height, clothed with squarrose scales. Sterile fronds very numerous, scattered along the rhizome, pinnate throughout, of two forms; those on the ground or on the lower part of the rhizome small, 3–6 in. long, $\frac{1}{2}$–1 in. broad, linear or linear-lanceolate; pinnae $\frac{1}{4}$–$\frac{1}{2}$ in. long, oblong to orbicular-oblong, sharply and deeply toothed. Fronds from the upper part of the rhizome much larger, 1–$2\frac{1}{2}$ ft. long, 3–6 in. broad, lanceolate, pendulous, hardly coriaceous, dark-green, glabrous or more or less scaly along the rhachis and costae; stipes short, scaly at the base. Pinnae numerous, $1\frac{1}{2}$–4 in. long, about $\frac{1}{2}$ in. broad, lanceolate,

falcate, narrowed upwards into a finely acuminate point, shortly stipitate and truncate or rounded or cordate at the base, margins regularly and finely crenate-dentate. Fertile fronds from near the top of the rhizome, ovate or ovate-oblong in outline; pinnae numerous, 3–6 in. long, $\frac{1}{8}$ in. broad, very narrow-linear or almost filiform. Indusium very narrow.—Lomaria filiformis *A. Cunn. Precur.* (1836) n. 183; *Raoul Choix* (1846) 37; *Hook. Sp. Fil.* iii (1860) 33, t. 149; *Hook. f. Handb. N.Z. Fl.* (1864) 366; *Hook. and Bak. Syn. Fil.* (1873) 180; *Thoms. N.Z. Ferns* (1882) 68; *Field N.Z. Ferns* (1890) 109, t. 10, f. 3, 3A, 3D; *Cheesem. Man. N.Z. Fl.* (1906) 982. L. propinqua *A. Cunn. Precur.* (1836) n. 184. L. pimpinellifolia *Hook. f. in Hook. Lond. Journ. Bot.* iii (1844) 412. Stenochlaena heteromorpha *J. Smith in Hook. Lond. Journ. Bot.* iv (1845) 149; *Hook. f. Fl. Nov. Zel.* ii (1855) 46; *Brack. Bot. U.S. Expl. Exped.* (1854) 77. Osmunda reptans *Forst. f. Prodr.* (1786) n. 93 (*nomen*).

North and South Islands: In forests from the North Cape southwards to Nelson and Marlborough, abundant. Sea-level to 2000 ft.

Also recorded from the Fiji Islands. A most distinct species, remarkable for its very long climbing rhizome and dimorphic sterile fronds.

11. **B. nigrum** *Metten. in Ann. Sci. Nat.* xv (1861) 69.—Rhizome short, stout, suberect, clothed with the bases of the old stipites mixed with chaffy scales. Stipes slender, densely scaly, 1–3 in. long. Sterile fronds tufted at the top of the rhizome, spreading, 3–8 in. long, 1–1½ in. broad, linear-oblong, membranous, blackish-green or lurid-green, brittle when dry, glabrous or the margins and under-surface more or less clothed with short rufous hairs, lyrate-pinnatifid, pinnate at the base; rhachis usually densely pubescent. Pinnae 4–8 pairs, unequal in size; the terminal one much the largest, 1–2 in. long, oblong, obtuse, irregularly lobed or sinuate; the lateral $\frac{1}{4}$–$\frac{3}{4}$ in. long, oblong to orbicular-oblong, irregularly sinuate, the lowest pair larger than those immediately above, and often stipitate and deflexed. Fertile fronds few, erect, pinnate; pinnae few, distant, narrow-linear, apiculate, the terminal one elongated, the lateral much shorter.—Lomaria nigra *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 176; *Hook. Ic. Plant.* t. 960; *Sp. Fil.* iii (1860) 35; *Hook. f. Fl. Nov. Zel.* ii (1855) 31; *Handb. N.Z. Fl.* (1864) 369; *Hook. and Bak. Syn. Fil.* (1873) 181; *Thoms. N.Z. Ferns* (1882) 69; *Field N.Z. Ferns* (1890) 110, t. 25, f. 4, 4A; *Cheesem. Ill. N.Z. Fl.* ii (1914) t. 241. Polybotrya nana *Fèe Acrost.* (1845) 75, t. 38, f. 1.

North Island: Dark gloomy forests from Hokianga and Mangonui southwards, not common. South Island: Nelson—Collingwood, *D. Grant;* Takaka and West Wanganui, *Kingsley.* Westland—Abundant at low elevations, *Enys! A. Hamilton! J. W. Brame!* &c. Otago—Milford Sound, Bligh's Sound, *Lyall, Hector* and *Buchanan.* Stewart Island: Rare, *Cockayne!* Sea-level to 3000 ft.

Easily recognized by the enlarged terminal portion of the frond, which is often only shallowly lobed, while the lower pinnae are usually distinct from one another. The surface of the frond is often overgrown with mosses or hepaticae, in the same manner as in *Trichomanes elongatum.*

12. **B. fluviatile** *Salom. Nomencl.* (1883) 115.—Rhizome stout, suberect, often woody, densely clothed with the bases of the old stipites and with chestnut-brown subulate scales. Stipes very short, densely scaly. Sterile fronds very numerous, forming a broad spreading crown at the top of the rhizome, 1–2½ ft. high, $\frac{3}{4}$–1½ in. broad, linear or linear-lanceolate,

submembranous, pale brownish-green, pinnate throughout; rhachis densely clothed with spreading subulate scales. Pinnae very numerous, 20–50 pairs, $\frac{1}{2}$–$\frac{3}{4}$ in. long, $\frac{1}{4}$–$\frac{1}{3}$ in. broad, oblong to orbicular-oblong, obtuse, not decurrent, the lower more remote and often shortly stipitate, the upper sessile, the uppermost usually adnate; margins thin, sinuate or denticulate. Fertile fronds narrow-linear, erect; pinnae $\frac{1}{3}$–$\frac{2}{3}$ in. long, $\frac{1}{8}$ in. broad, linear, obtuse, erecto-patent.—Lomaria fluviatilis *Spreng. Syst. Veg.* iv (1827) 64; *Hook. Sp. Fil.* iii (1860) 34; *Hook. f. Fl. Nov. Zel.* ii (1855) 28; *Fl. Tasm.* ii (1860) 142, t. 167; *Handb. N.Z. Fl.* (1864) 366; *Hook. and Bak. Syn. Fil.* (1873) 181; *Benth. Fl. Austral.* vii (1878) 736; *Thoms. N.Z. Ferns* (1882) 69; *Field N.Z. Ferns* (1890) 109, t. 27, f. 2, 2A; *Cheesem. Man. N.Z. Fl.* (1906) 983. L. rotundifolia *Raoul Choix* (1846) 9, t. 23. L. rotundifolia *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 179. Stegania fluviatilis *R. Br. Prodr.* (1810) 152.

North and South Islands, Chatham Islands, Stewart Island: From Hokianga and Whangaroa southwards, not uncommon in damp hilly forests. Sea-level to 2500 ft.

Also in Victoria and Tasmania. A crested form is occasionally seen, and has been described by Mr. Colenso as var. *ramosa* (Trans. N.Z. Inst. xx (1888) 225).

13. **B. membranaceum** *Metten. Ann. Sci. Nat.* xv (1861) 77.—Rhizome short, stout, suberect, clothed with the bases of the old stipites mixed with a few subulate scales. Stipes very short, scaly at the base. Fronds tufted at the top of the rhizome, the sterile ones 3–10 in. long, $\frac{3}{4}$–$1\frac{1}{2}$ in. broad, lanceolate or linear-lanceolate, acuminate, broadest above the middle, gradually narrowed to the base, rather membranous, pale-green, quite glabrous, pinnate; rhachis smooth, naked. Pinnae numerous, spreading or erecto-patent, the longest $\frac{1}{2}$–$\frac{3}{4}$ in. long, about $\frac{1}{4}$ in. broad, ovate-oblong or oblong, obtuse, broadly adnate at the base but not dilated nor decurrent, coarsely dentate-serrate, the lower quite distinct at the base, gradually becoming smaller and eventually reduced to mere rounded auricles, the uppermost more or less confluent. Fertile fronds usually longer than the sterile and with longer stipites, pinnate; pinnae distant, $\frac{1}{6}$–$\frac{1}{2}$ in. long, linear, apiculate.—Lomaria membranacea *Col. in Hook. Sp. Fil.* iii (1860) 34, t. 145; *Hook. Handb. N.Z. Fl.* (1864) 366; *Hook. and Bak. Syn. Fil.* (1873) 181; *Thoms. N.Z. Ferns* (1882) 69; *Field N.Z. Ferns* (1890) 111, t. 5, f. 6, 6A; *Cheesem. Man. N.Z. Fl.* (1906) 984. L. oligoneuron *Col. in Trans. N.Z. Inst.* xvi (1884) 346. L. intermedia *Col. l.c.* xix (1887) 274. L. pygmaea *Col. l.c.* xxv (1893) 322.

North Island: Shaded places by the banks of streams, not uncommon throughout. South Island: In various localities along the east coast from Nelson to Otago, but apparently rare and local. Sea-level to 2000 ft.

Large forms of this, with longer and narrower pinnae rather more closely placed, are difficult to distinguish from *B. lanceolatum*, if, indeed, the two species do not pass directly into one another. In its usual state, however, it is a much smaller plant, with shorter and broader obtuse pinnae, distinctly separated from one another, and not dilated at the base or decurrent as in *lanceolatum*. I have seen no specimens from Canterbury or Otago.

14. **B. Fraseri** *Luerss. in Flora* (1876) 292.—Rhizome erect, clothed with the bases of the old stipites and with a dense tuft of dark chestnut-brown scales at the tip, often elongated into a slender caudex 6–24 in. high or more, resembling the trunk of a miniature tree-fern. Stipes 3–9 in.

high, scaly towards the base. Fronds forming a spreading crown at the top of the caudex, 9–18 in. long, 3–6 in. broad, ovate or ovate-oblong to ovate-lanceolate, acuminate, quite glabrous, almost membranous or subcoriaceous, bipinnate; rhachis with a narrow interrupted wing furnished with numerous triangular lobes. Pinnae 2–3 in. long, $\frac{1}{3}$–$\frac{2}{3}$ in. broad, lanceolate or linear-lanceolate, acuminate, cut down almost to the rhachis. Pinnules numerous, close-set, $\frac{1}{4}$–$\frac{1}{3}$ in. long, linear-oblong, somewhat falcate, acute or apiculate, entire or serrate. Veins indistinct, simple or forked. Fertile fronds similar to the sterile, but rather smaller and with narrower pinnules. Sori covering the whole under-surface. — Lomaria Fraseri *A. Cunn. Precur.* (1836) n. 185; *Raoul Choix* (1846) 37; *Hook. Ic. Plant.* t. 185; *Sp. Fil.* iii (1860) 40; *Hook. f. Fl. Nov. Zel.* ii (1855) 31; *Handb. N.Z. Fl.* (1864) 369; *Hook. and Bak. Syn. Fil.* (1873) 182; *Thoms. N.Z. Ferns* (1882) 70; *Field N.Z. Ferns* (1890) 111, t. 24, f. 4, 4A; *Cheesem. Man. N.Z. Fl.* (1906) 984; *Ill. N.Z. Fl.* ii (1914) t. 242.

North Island: Abundant in dry woods from the North Cape southwards to the Upper Waikato and Taranaki. South Island: Nelson—Massacre Bay, *Lyall;* West Wanganui, *Kingsley;* extending along the West Coast as far south as Charleston, *T. Kirk.* Sea-level to 2000 ft.

A very handsome and distinct species, quite unlike any other. It has been found in the Philippine Islands, and specimens from thence have been described by Dr. Christ as "var. *philippensis.*" Examples kindly forwarded to me by Dr. Merrill, of Manila, show but little difference from the New Zealand plant, but the caudex is said to attain a height of 6 ft.

20. **DOODIA** R. Br.

Rhizome short, tufted, suberect. Fronds numerous at the top of the rhizome, erect, harsh and rigid or membranous, pinnate or pinnatifid, sometimes dimorphic. Veins forked, connected by short cross veinlets on which the sori are placed. Sori oblong or slightly curved, in one or more rows parallel to the midrib, and between it and the margin of the pinnae. Indusium the same shape as the sorus, attached to the cross veinlet, membranous, opening towards the midrib. Sporangia stalked, surrounded by an incomplete vertical ring, bursting transversely.

A small genus of 5 species, found in New Zealand, Australia and Polynesia, and Ceylon.

Fronds 1–2 ft., harsh, coriaceous, erect; the sterile not obviously differing from the fertile .. .. 1. *D. media.*

Fronds $\frac{1}{2}$–1 ft., submembranous; the sterile shorter and less erect, with broader obtuse pinnae. Fertile pinnae narrow-linear, with conspicuous auricled bases.. .. .. 2. *D. caudata.*

1. **D. media** *R. Br. Prodr.* (1810) 151.—Rhizome short, stout, suberect, clothed with the bases of the old stipites. Stipes 3–8 in. long, more or less clothed with subulate scales towards the base, smooth or scabrous, blackish-brown. Fronds 12–18 in. long, $1\frac{1}{2}$–4 in. broad, lanceolate, acuminate, coriaceous, dark-green, pinnate in the lower half or two-thirds, pinnatifid above; rhachis often pubescent. Pinnae numerous, spreading; lateral 1–2 in. long, $\frac{1}{5}$–$\frac{1}{3}$ in. broad, linear or linear-lanceolate, acute or obtuse, spinulose-dentate, the upper ones dilated and confluent at the base, those below the middle free but often dilated or almost auricled at the base, the lower ones gradually reduced in size; terminal pinna often elongated. Sori short, oblong, usually in one series on each side of the midrib, but sometimes portions of a second row are irregularly developed.—*Hook. Sp.*

Fil. iii (1860) 74; *Hook. f. Handb. N.Z. Fl.* (1864) 370; *Hook. and Bak. Syn. Fil.* (1873) 190; *Thoms. N.Z. Ferns* (1882) 70; *Field N.Z. Ferns* (1890) 112, t. 20, f. 1; *Cheesem. Man. N.Z. Fl.* (1906) 985. D. aspera *A. Rich. Fl. Nouv. Zel.* (1832) 76; *A. Cunn. Precur.* (1836) n. 195; *Raoul Choix* (1846) 38 (*not of R. Br.*). D. Kunthiana *Gaud. in Freyc. Voy. Bot.* (1827) 401, t. 14; *A. Cunn. Precur.* (1836) n. 197; *Raoul Choix* (1846) 38.

Var. **Milnei** *Bak. Syn. Fil.* edit. 2 (1873) 482.—Larger; fronds 1–2 ft. long or more, 6–12 in. broad. Pinnae closely placed, $\frac{1}{4}$–$\frac{1}{2}$ in. long, $\frac{1}{4}$–$\frac{1}{2}$ in. broad, narrowed into long acuminate points, sharply dentate-serrate. Sori copious, in 2 rows on each side of the midrib.—D. Milnei *Carr. in Seem. Fl. Viti.* (1873) 352. D. connexa *Hook. f. Handb. N.Z. Fl.* (1864) 369 (*not of Kunze*).

North Island: Abundant from the North Cape to the East Cape, from thence rare and local to Cook Strait. South Island: Nelson—Port Hills, *T. Kirk!* Var. *Milnei.* —Kermadec Islands: Abundant, *McGillivray, T. F. C., Oliver!* Sea-level to 1000 ft.

Also in Australia, Norfolk Island, and the Pacific islands as far north as Hawaii A very variable plant.

2. **D. caudata** *R. Br. Prodr.* (1810) 151.—Rhizome short, suberect, emitting numerous black wiry rootlets. Stipes 2–4 in. long, slender, black, smooth or nearly so. Fronds numerous, densely tufted, 3–12 in. long, rarely more, $\frac{3}{4}$–2 in. broad, lanceolate, acuminate or caudate, usually membranous, pale-green, pinnate almost to the top, more or less dimorphic; sterile usually shorter than the fertile and less erect, often decumbent, sometimes almost flaccid; pinnae oblong or linear-oblong, obtuse, sharply serrate. Fertile fronds longer, usually harsher and more rigid, erect; pinnae $\frac{1}{2}$–$1\frac{1}{2}$ in. long, $\frac{1}{8}$–$\frac{1}{5}$ in. broad, narrow-linear, often attenuate, the lower ones usually conspicuously auricled at the base, the uppermost decurrent and confluent, terminal pinna usually very long, caudate. Sori in a single series on each side of the midrib.—*A. Rich. Fl. Nouv. Zel.* (1832) 76; *A. Cunn. Precur.* (1836) n. 196; *Raoul Choix* (1846) 38; *Hook. f. Fl. Nov. Zel.* ii (1855) 37, *excl. syn.; Hook. and Bak. Syn. Fil.* (1873) 190; *Field N.Z. Ferns* (1890) 114, t. 20, f. 4, 4a; *Cheesem. Man. N.Z. Fl.* (1906) 986. D. squarrosa *Col. in Trans. N.Z. Inst.* xiii (1881) 382.

North Island: From Kaitaia southwards to Cook Strait, but local and often absent from large areas. Sea-level to 2500 ft.

Apparently a common Australian plant, ranging from Cape York to Tasmania. Some of the New Zealand forms approach very close to the preceding species; but usually it can be distinguished by the smaller size, by the sterile fronds being of a different shape and more flaccid than the fertile, and by the narrow fertile pinnae with conspicuously auricled bases. A small variety found on the Rimutaka Range, Wellington, is said to have scented fronds, and to have been formally collected by the Maoris for the purpose of mixing with oil to anoint the person; but I have never been able to preceive any fragrance. Perhaps *Polypodium pustulatum* has been mistaken for it. I have seen no authentic specimens of Colenso's *D. squarrosa*, and have followed Mr. Baker (Ann. Bot. v (1891) 221) in referring it to *D. caudata.*

21. **GYMNOGRAMME** Desv.

Rhizome short and tufted or long and creeping. Fronds very various, small or large, pinnate or 2–3-pinnate, rarely simple. Veins simple or forked, or more or less copiously anastomosing. Sori placed on the veins on the under-surface of the fronds, oblong or linear, often elongated, simple or forked. Indusium not developed. Sporangia stalked, bursting transversely, surrounded by an incomplete vertical ring.

As defined above, this is a heterogeneous assemblage of over 100 species, differing greatly from one another in habit, venation, and the arrangement of the sori, and often split up by authors into several small genera. Under this system *G. rutaefolia* would fall into the genus *Pleurosorus*, while *G. leptophylla*, with a few allied plants, would constitute the genus *Anogramma*. But in a small flora like that of New Zealand it seems inadvisable to encourage the multiplication of closely allied small genera, only separated by comparatively trivial characters.

Perennial. Fronds pinnate or 2-pinnatifid, subcoriaceous, densely clothed with ferruginous woolly hairs .. .. .. 1. *G. rutaefolia.*

Annual. Fronds 2-3-pinnate, thin and membranous, quite glabrous 2. *G. leptophylla.*

1. **G. rutaefolia** *Hook. and Grev. Ic. Fil.* (1829) t. 90.—Rhizome short, thick, erect or ascending, clothed with blackish-brown lanceolate scales. Stipes ¼–1 in. long, stout or slender, everywhere densely villous with soft ferruginous woolly often glandular hairs. Fronds 1–3 in. long by about ½ in. broad, linear-oblong, obtuse, subcoriaceous, pinnate; both surfaces densely clothed with soft ferruginous or silvery-brown woolly hairs, many of which are glandular-tipped. Pinnae alternate, rather distant, ⅛–½ in. long, obovate or rhomboid or flabellate, shortly stipitate and obliquely cuneate at the base, the lowermost with 2–3 shallow lobes or rarely pinnatifid. Veins flabellate. Sori linear-oblong, occupying most of the veins of the under-surface, distinct at first, but often confluent in age.—*Hook. Fil. Exot.* (1857–59) t. 5; *Sp. Fil.* v (1864) 137; *Hook. f. Fl. Nov. Zel.* ii (1855) 45; *Handb. N.Z. Fl.* (1864) 383; *Armstr. in Trans. N.Z. Inst.* xiii (1881) 359. G. Pozoi *var.* rutaefolia *Hook. and Bak. Syn. Fil.* (1873) 379; *Thoms. N.Z. Ferns* (1882) 91; *Field N.Z. Ferns* (1890) 144, t. 10, f. 1; *Cheesem. Man. N.Z. Fl.* (1906) 1016. G. alpina *Potts in Trans. N.Z. Inst.* x (1878) 361. Grammitis rutaefolia *R. Br. Prodr.* (1810) 146; *Benth. Fl. Austral.* vii (1878) 775. Ceterach rutaefolia *Metten. Fil. Hort. Lips.* (1856) 80. Pleurosorus rutaefolius *Fèe Gen. Fil.* (1850–52) 180.

North Island: Hawke's Bay—Mount Cameron, *F. Hutchinson!* Petane, *A. Hamilton!* Kuripapanga, *H. Hill!* Wellington—Cliffs in Cook Strait, *Colenso!* Cape Terawhiti, *Field.* South Island: Marlborough—D'Urville Island, *E. Craig!* Brothers Islands, *Field.* Canterbury—Banks Peninsula, Upper Ashburton, Upper Rangitata, *T. H. Potts!* Southern Alps, *J. D. Enys!* Otago—Black's, *Petrie.* Sea-level to 3500 ft.

Also widely distributed in Australia and Tasmania. It is united by most authors to the European *G. Pozoi*, which, however, seems to me to differ in the more slender habit, in being much less densely villous, the hairs seldom glandular, and in the narrower oblong (not obovate or flabellate) pinnae.

2. **G. leptophylla** *Desv. Journ. Bot.* i (1813) 26.—Slender, delicate, annual, 1–6 in. high. Roots fibrous. Stipes ½–3 in. long, slender, brittle, smooth, glossy, bright chestnut-brown. Fronds 1–3 in. long, ½–1 in. broad, ovate or ovate-oblong to oblong-lanceolate; the outer spreading, much shorter and broader, usually sterile; the inner longer and narrower, fertile, erect; pale-green, shining, thin and membranous, quite glabrous, 2–3-pinnate. Pinnae alternate, stipitate, ¼–½ in. long, again pinnate; secondary rhachises margined throughout. Pinnules few, obovate-cuneate, 2–3-lobed or -partite; lobes linear or linear-oblong, obtuse. Veins forked, a single veinlet only to each lobe. Sori oblong or linear-oblong, usually a single one to each lobe, often becoming confluent and covering the whole pinnule.—*Hook. and Grev. Ic. Fil.* (1829) t. 25; *Hook. Sp. Fil.* v (1864) 136; *Hook. f. Fl. Nov. Zel.* ii (1855) 45; *Handb. N.Z. Fl.* (1864) 383; *Hook. and Bak. Syn. Fil.* (1873) 383; *Thoms. N.Z. Ferns* (1882) 92; *Field N.Z. Ferns*

(1890) 144, t. 16, f. 6; *Cheesem. Man. N.Z. Fl.* (1906) 1016. G. novae-zelandiae *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 165. Grammitis leptophylla *Swartz Syn. Fil.* (1806) 218; *Benth. Fl. Austral.* vii (1878) 776. Anogramme leptophylla *Link Fil. Sp.* (1841) 137.

North Island: Auckland—Volcanic hills on the Auckland Isthmus, once common, now rare and apparently restricted to Mount Wellington and Mount Smart, *Colenso*, &c.; Mount Maunganui (near Tauranga), *Mrs. Hetley!* East Cape district, *Bishop Williams.* Hawke's Bay—Scinde Island, *Colenso!* Ruahine Mountains, *H. Tryon!* Wellington—Miramar, *Buchanan!* South Island: Canterbury—Lyttelton Harbour, abundant, *T. H. Potts!* Otago—Near Dunedin, *Purdie;* Upper Clutha, *Petrie.* Sea-level to 1500 ft.

Also in south Europe, North and South Africa, Persia, India, Australia and Tasmania, and South America.

22. **PELLAEA** Link.

Rhizome usually creeping. Fronds tufted, or scattered along the rhizome, simply pinnate in the New Zealand species, 2–3-pinnate and often palmate or pedate in others; texture subcoriaceous or membranous; veins always free but often obscure. Sori marginal, in an early stage distinct and oblong or linear-oblong, decurrent along the tips of the veins, but soon becoming confluent and forming a continuous broad or narrow marginal band. Indusium formed of the modified edge of the frond, continuous, often very narrow, at first involute over the sori, ultimately spreading, often hidden by the ripe sporangia. Sporangia stalked, with an incomplete vertical ring, bursting transversely.

About 60 species are known, found in the temperate and tropical regions of both hemispheres. One of the two New Zealand species extends as far north as India, the other is said to occur in Australia.

Erect. Pinnae ¾–2 in. long, lanceolate to linear-oblong .. 1. *P. falcata.*

Often decumbent. Pinnae ⅓–¾ in. long, oblong to orbicular .. 2. *P. rotundifolia.*

1. **P. falcata** *Fèe Gen. Fil.* (1850–52) 129.—Rhizome stout, creeping, scaly. Stipes 3–6 in. long, strong, erect, dark red-brown or almost black, more or less hispid with spreading scales. Fronds 12–18 in. long or more, 1½–3 in. broad, linear or linear-oblong, simply pinnate; rhachis densely scaly and bristly. Pinnae 15–40 on a side, quite entire, alternate, shortly petiolate or the upper sessile, ¾–2 in. long, ¼–½ in. broad, lanceolate or oblong-lanceolate to linear-oblong, often slightly falcate, acute or mucronate, truncate or cuneate at the base, the lower ones slightly auriculate on the upper margin near the base; texture coriaceous; both surfaces glabrous or nearly so; veins not visible. Sori usually forming a broad continuous marginal band all round the pinnae. Indusium very narrow, membranous, continuous.—*Hook. Sp. Fil.* ii (1858) 135, t. 111B; *Hook. f. Handb. N.Z. Fl.* (1864) 363; *Hook. and Bak. Syn. Fil.* (1873) 151; *Thoms. N.Z. Ferns* (1882) 58; *Field N.Z. Ferns* (1890) 88, t. 18, f. 4; *Cheesem. Man. N.Z. Fl.* (1906) 968. Pteris falcata *R. Br. Prodr.* (1810) 154; *Hook. f. Fl. Nov. Zel.* ii (1855) 24; *Benth. Fl. Austral.* vii (1878) 729. P. seticaulis *Hook. Ic. Plant.* (1840) t. 207. Platyloma falcatum *J. Smith in Journ. Bot.* (1841) 160.

Kermadec Islands: *McGillivray, T. F. C., Oliver!* North Island: Auckland—In various localities from Kaitaia to the Waikato River, but rare and local. South Island: Nelson—Dun Mountain, *Potts;* near Nelson, *D. Grant;* Graham River, *T. F. C.*

Extends to Australia and Tasmania, the Malay Archipelago, and India. All the New Zealand specimens that I have seen have shorter and broader pinnae than the typical state, and approach *P. rotundifolia* so closely as to make it probable that the two species are forms of one plant.

2. **P. rotundifolia** *Hook. Sp. Fil.* ii (1858) 136.—Habit of *P. falcata*, but smaller and more slender, and fronds often decumbent. Rhizome long, rigid, wiry, creeping, clothed with appressed scales. Stipes 3–6 in. long, dark red-brown, densely pubescent and scaly. Fronds 6–14 in. long, $\frac{3}{4}$–$1\frac{1}{2}$ in. broad, linear, simply pinnate ; rhachis bristly and scaly throughout. Pinnae 10–30 on each side, alternate, petiolate or the upper sessile, quite entire, $\frac{1}{3}$–$\frac{3}{4}$ in. long, $\frac{1}{4}$–$\frac{1}{2}$ in. broad, variable in shape, oblong or oblong-ovate to orbicular, obtuse or mucronate at the tip, rounded or obliquely truncate at the base, glabrous or nearly so, coriaceous ; veins concealed. Sori forming broad marginal lines on both the upper and lower edges of the pinnae, but not so continuous as in *P. falcata*. Indusia very numerous, membranous, involute when young, but soon reflexed and often concealed by the sporangia.—*Hook. Fil. Exot.* (1857–59) t. 48 ; *Hook. f. Handb. N.Z. Fl.* (1864) 363 ; *Hook. and Bak. Syn. Fil.* (1873) 151 ; *Thoms. N.Z. Ferns* (1882) 59 ; *Field N.Z. Ferns* (1890) 89, t. 14, f. 2 ; *Cheesem. Man. N.Z. Fl.* (1906) 969. Pteris rotundifolia *Forst. f. Prodr.* (1786) n. 420 ; *A. Rich. Fl. Nouv. Zel.* (1832) 78 ; *A. Cunn. Precur.* (1836) n. 198 ; *Raoul Choix* (1846) 38 ; *Hook. Ic. Plant.* (1842) t. 422 ; *Benth. Fl. Austral.* vii (1878) 730. Allosurus rotundifolius *Kunze in Linnæa*, xxviii (1850) 219. Platyloma rotundifolium *J. Smith in London Journ. Bot.* (1841) 160.

North and South Islands, Chatham Islands : From the North Cape to Foveaux Strait, not uncommon in dry woods. Sea-level to 2000 ft.

Also in Norfolk Island ; and Bentham refers a Queensland plant to the same species.

23. **NOTHOCHLAENA** R. Br.

Rhizome short and tufted or long and creeping. Fronds usually small, erect, pinnate or 2–3-pinnate ; under-surface more or less densely scaly or woolly or coated with white powder ; texture coriaceous. Veins free, forked, not anastomosing. Sori marginal, oblong or rounded, terminating the veins, at first distinct, but soon confluent into a continuous or interrupted marginal line, often partly concealed by the slightly inflexed margin of the frond, but with no true indusium. Sporangia stalked, bursting transversely, girt by an incomplete vertical ring.

A genus of between 30 and 40 species, widely dispersed through the tropical and warm temperate regions of both hemispheres. It hardly differs from *Cheilanthes*, except in the recurved margin of the frond not being distinctly modified into an indusium. The single New Zealand species is also found in Australia, Norfolk Island, and New Caledonia.

Cheilanthes distans (R.Br.) Copel.

1. **N. distans** *R. Br. Prodr.* (1810) 146.—Rhizome short, stout, suberect or prostrate, clothed with the bases of the old stipites and with ferruginous linear scales. Stipes 1–4 in. long, stiff, wiry, erect, dark chestnut-brown, more or less clothed with subulate-lanceolate scales. Fronds numerous, tufted at the top of the rhizome, 3–6 in. long without the stipes, $\frac{1}{2}$–1 in. broad, linear-oblong, erect, rigid, subcoriaceous,

sparingly villous or hairy above, beneath densely covered with long linear-subulate ferruginous scales, 2-pinnate. Primary pinnae stipitate, opposite or nearly so, the lower remote, $\frac{1}{3}$–$\frac{2}{3}$ in. long, ovate-deltoid, pinnate at the base, pinnatifid above. Pinnules few, seldom more than 2–3 pairs, ovate-oblong, obtuse, the lowest pinnatifid at the base; margins recurved. Sori forming a continuous line round the margin.—*Hook. Ic. Plant.* (1854) t. 980; *Sp. Fil.* v (1864) 114; *Hook. f. Fl. Nov. Zel.* ii (1855) 46; *Handb. N.Z. Fl.* (1864) 383; *Hook. and Bak. Syn. Fil.* (1873) 373; *Benth. Fl. Austral.* vii (1878) 774; *Thoms. N.Z. Ferns* (1882) 91; *Field N.Z. Ferns* (1890) 143, t. 16, f. 3; *Cheesem. Man. N.Z. Fl.* (1906) 1015. Cheilanthes *n. sp. Field N.Z. Ferns* (1890) 88, t. 28, f. 4.

North Island: Rocky places from the Bay of Islands to Cook Strait, local. South Island: Near Nelson, *T. F. C.* Banks Peninsula and other localities in Canterbury, *Armstrong, T. H. Potts, A. Wall!* Sea-level to 2500 ft.

Often confused with *Cheilanthes Sieberi*, of which it has the habit and general appearance; but a smaller plant, with the frond conspicuously shaggy and scaly beneath.

24. **CHEILANTHES** Swartz.

Rhizome short and tufted, or long and creeping. Fronds usually small, erect, 2–3-pinnate; texture subcoriaceous. Veins free, forked, not anastomosing. Sori marginal, terminating the veins, small, rounded or oblong, at first distinct, afterwards more or less confluent. Indusium roundish or oblong, consisting of a more or less modified tooth or lobule of the frond, reflexed over the sorus and in the young state more or less concealing it. Sporangia stalked, bursting transversely, girt by an incomplete vertical ring.

A genus of about 80 species, found in most tropical and temperate regions. It is only separated from *Nothochlaena* by the modified tooth or lobule of the frond reflexed over the sorus, a character which is sometimes so obscure that it is difficult to separate the two genera. The two New Zealand species are both widely distributed.

Fronds broad, deltoid .. .. 1. *C. tenuifolia.*
Fronds linear-oblong or linear .. .. 2. *C. Sieberi.*

1. **C. tenuifolia** *Swartz Syn. Fil.* (1806) 129, 332.—Rhizome very short, suberect, clothed with silky scales. Stipes 3–9 in. long, tufted, wiry, erect, dark red-brown, smooth and polished, glabrous or slightly scaly when young. Fronds 4–10 in. long, 2–4 in. broad, deltoid or ovate-deltoid, submembranous, yellowish-green, 3-pinnatifid; rhachis smooth, polished, glabrous or nearly so. Primary pinnae 6–12 on each side, opposite or nearly so, ascending or spreading; the lowest pair sometimes $2\frac{1}{2}$ in. long, deltoid; the upper smaller and narrower. Pinnules oblong or elliptic-oblong, deeply pinnatifid; ultimate segments entire or irregularly lobed or crenate; surfaces glabrous. Sori on the margins of the lobes, generally confluent and continuous all round the edge of the pinnules. Indusium narrow, elongated, usually crenate or denticulated, often transversely wrinkled.—*Hook. Sp. Fil.* ii (1858) 82, t. 87c; *Hook. and Bak. Syn. Fil.* (1873) 138; *Benth. Fl. Austral.* vii (1878) 726; *T. Kirk in Trans. N.Z. Inst.* (1874) 248; *Thoms. N.Z. Ferns* (1882) 57; *Field N.Z. Ferns* (1890) 86, t. 21, f. 2, 3; *Chesem. Man. N.Z. Fl.* (1906) 967. C. Kirkii *Armstr. in Trans. N.Z. Inst.* xiii (1881) 360 (*not of Hook.*). C. venosa *Col. in Trans. N.Z. Inst.* xxv (1893) 321. Pteris alpina *Field N.Z. Ferns* (1890) 97, t. 28, f. 2.

North Island: Auckland—Mount Maunganui, near Tauranga, *Mrs. Hetley!* Hawke's Bay—Mohaka, *E. Craig!* Petane, *A. Hamilton!* in various localities, *Colenso!* Wellington—Near Wanganui, *H. C. Field.* South Island: Canterbury—Banks Peninsula, *Lyall, Armstrong, T. Kirk!* Otago—Mountains near Lake Wakatipu, *Buchanan;* Lake Wanaka, *Mrs. Mason!* Sea-level to 2500 ft.

Extends northwards through Australia to the Malay Archipelago, India, and China. The typical state is easily distinguished from the following species by the broad deltoid frond, but intermediates are occasionally seen.

2. **C. Sieberi** *Kunze in Pl. Preiss.* ii (1847) 112.—Rhizome short, stout, creeping, clothed with chestnut-brown scales. Stipes 3–9 in. long, densely tufted, erect, wiry, dark chestnut-brown, polished, glabrous or with a few fibrillose scales. Fronds 3–9 in. long, $\frac{3}{4}$–$1\frac{1}{2}$ in. broad, linear-oblong or linear, erect, rigid, glabrous, 2–3-pinnatifid; rhachis smooth, glossy. Primary pinnae 3–15 opposite pairs, ascending, the lower rather remote, $\frac{1}{2}$–1 in. long, ovate-deltoid. Pinnules oblong, deeply pinnatifid; segments entire or cuneate, margins much recurved when dry. Sori roundish or oblong, distinct, or ultimately confluent and continuous round the margins of the pinnules. Indusium usually elongated, narrow; margins pale, entire or minutely denticulate.—*Hook. Sp. Fil.* ii (1858) 83, t. 97B; *Hook. and Bak. Syn. Fil.* (1873) 137; *Thoms. N.Z. Ferns* (1883) 58; *Field N.Z. Ferns* (1890) 87, t. 21, f. 1; *Cheesem. Man. N.Z. Fl.* (1906) 967. C. tenuifolia *A. Rich. Fl. Nouv. Zel.* (1832) 83; *A. Cunn. Precur.* (1836) n. 210; *Raoul Choix* (1846) 38; *Hook. f. Fl. Nov. Zel.* ii (1855) 23 (*for the greater part, but not of Swartz*). C. tenuifolia *var.* Sieberi *Hook. f. Handb. N.Z. Fl.* (1864) 362. C. erecta *Col. in Trans. N.Z. Inst.* xxviii (1896) 619.

North and South Islands: From the North Cape southwards, not uncommon in dry rocky places.

Abundant in Australia, and also found in New Caledonia and the Isle of Pines.

25. HYPOLEPIS Bernh.

Rhizome usually wide-creeping. Fronds large, 2–3-pinnate or decompound, often glandular or tomentose; texture membranous or herbaceous. Veins forked, free, never anastomosing. Sori small, globose, distinct, placed in the sinuses of the ultimate divisions of the frond. Indusium orbicular or reniform, membranous, composed of the modified margin of the frond, reflexed over the sorus and more or less covering it. Sporangia stalked, bursting transversely, with an incomplete vertical ring.

Species 24, confined to the tropics and the South Temperate Zone. Of the 3 species found in New Zealand, 2 are endemic, the remaining 1 extends to Australia, Polynesia, and the Malay Archipelago. The genus only differs from the *Phegopteris* section of *Dryopteris* by the sori being partly covered by an incurved lobule of the frond.

Fronds (with the stipes) 2–5 ft., deltoid, tomentose, 4-pinnate. Pinnules crenate-toothed .. .. 1. *H. tenuifolia.*

Fronds (with the stipes) 9–24 in., deltoid, almost glabrous, 3-pinnate, pale-green. Pinnules deeply and sharply toothed .. 2. *H. millefolium.*

Fronds (with the stipes) 6–20 in., lanceolate, almost glabrous, 2-pinnate, brownish-green. Pinnules deeply toothed .. .. 3. *H. distans.*

1. **H. tenuifolia** *Bernh. in Schrad. Neu Journ. Bot.* ii, 34.—Rhizome long, stout, creeping, densely clothed with red-brown linear scales. Stipes

1–2 ft. high or more, strong, erect, brown or yellow-brown, slightly rough with minute points, naked or pubescent, usually scaly towards the base. Fronds 1–3 ft. long, ½–2 ft. broad, ovate-oblong to broadly deltoid, pale-green, membranous or subcoriaceous, 4-pinnatifid; primary and secondary rhachises more or less tomentose with crisped hairs, rarely glabrous. Primary pinnae 8–20 in. long, 4–10 in. broad, ovate or ovate-lanceolate, acuminate; secondary and tertiary lanceolate or oblong-lanceolate. Ultimate divisions linear-oblong, obtuse or acute, crenate-toothed; costa and sometimes the under-surface more or less pubescent. Sori numerous, rounded, placed in the sinuses between the teeth or lobes. Indusium composed of the reflexed scale-like tip of a lobule of the frond, sometimes covering the sorus when young, often very inconspicuous when old.—*Hook. Sp. Fil.* ii (1858) 60, t. 89c and 90A; *Hook. f. Fl. Nov. Zel.* ii (1855) 22; *Handb. N.Z. Fl.* (1864) 361; *Hook. and Bak. Syn. Fil.* (1873) 129; *Benth. Fl. Austral.* vii (1878) 746; *Thoms. N.Z. Ferns* (1882) 56; *Field N.Z. Ferns* (1890) 84, t. 24, f. 3, *and* t. 27, f. 4; *Cheesem. Man. N.Z. Fl.* (1906) 965. H. dicksonioides *Hook. Sp. Fil.* ii (1858) 61. H. Petrieana *Carse in Trans. N.Z. Inst.* l (1918) 64. Cheilanthes ambigua *A. Rich. Fl. Nouv. Zel.* (1832) 84; *A. Cunn. Precur.* (1836) n. 211; *Raoul Choix* (1846) 38. C. arborescens *Swartz Syn. Fil.* (1806) 129, t. 336. C. pellucida *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 173. Lonchites tenuifolia *Forst. f. Prodr.* (1786) n. 424.

Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Abundant throughout. Sea-level to 2000 ft.

Also in Norfolk Island, Australia, the Pacific islands, and Java. A most variable fern; in habit and general appearance often so close to *Phegopteris punctata* that the suspicion naturally arises that the two species may be forms of one plant, a view which is rendered more probable by the fact that the indusium is sometimes so feebly developed that the technical distinction separating *Hypolepis* and the *Phegopteris* section of *Dryopteris* is obliterated. Usually, however, *Polypodium punctatum* can be distinguished by

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Hypolepis

"(1) H. tenuifolia Bernh.
(2) H. punctata (Thunb.) Mett. Syn. H. Petrieana Carse.
(3) H. rugosula (Labill.) J. Smith. Syn. Dryopteris punctata (see No.1 of this paper)."

North Island: Auckland—Mount Maunganui, near Tauranga, *Mrs. Hetley!* Hawke's Bay—Mohaka, *E. Craig!* Petane, *A. Hamilton!* in various localities, *Colenso!* Wellington—Near Wanganui, *H. C. Field.* South Island: Canterbury—Banks Peninsula, *Lyall, Armstrong, T. Kirk!* Otago—Mountains near Lake Wakatipu, *Buchanan;* Lake Wanaka, *Mrs. Mason!* Sea-level to 2500 ft.

Extends northwards through Australia to the Malay Archipelago, India, and China. The typical state is easily distinguished from the following species by the broad deltoid frond, but intermediates are occasionally seen.

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rse.
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1–2 ft. high or more, strong, erect, brown or yellow-brown, slightly rough with minute points, naked or pubescent, usually scaly towards the base. Fronds 1–3 ft. long, ½–2 ft. broad, ovate-oblong to broadly deltoid, pale-green, membranous or subcoriaceous, 4-pinnatifid; primary and secondary rhachises more or less tomentose with crisped hairs, rarely glabrous. Primary pinnae 8–20 in. long, 4–10 in. broad, ovate or ovate-lanceolate, acuminate; secondary and tertiary lanceolate or oblong-lanceolate. Ultimate divisions linear-oblong, obtuse or acute, crenate-toothed; costa and sometimes the under-surface more or less pubescent. Sori numerous, rounded, placed in the sinuses between the teeth or lobes. Indusium composed of the reflexed scale-like tip of a lobule of the frond, sometimes covering the sorus when young, often very inconspicuous when old.—*Hook. Sp. Fil.* ii (1858) 60, t. 89c and 90a; *Hook. f. Fl. Nov. Zel.* ii (1855) 22; *Handb. N.Z. Fl.* (1864) 361; *Hook. and Bak. Syn. Fil.* (1873) 129; *Benth. Fl. Austral.* vii (1878) 746; *Thoms. N.Z. Ferns* (1882) 56; *Field N.Z. Ferns* (1890) 84, t. 24, f. 3, *and* t. 27, f. 4; *Cheesem. Man. N.Z. Fl.* (1906) 965. H. dicksonioides *Hook. Sp. Fil.* ii (1858) 61. H. Petrieana *Carse in Trans. N.Z. Inst.* l (1918) 64. Cheilanthes ambigua *A. Rich. Fl. Nouv. Zel.* (1832) 84; *A. Cunn. Precur.* (1836) n. 211; *Raoul Choix* (1846) 38. C. arborescens *Swartz Syn. Fil.* (1806) 129, t. 336. C. pellucida *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 173. Lonchites tenuifolia *Forst. f. Prodr.* (1786) n. 424.

Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Abundant throughout. Sea-level to 2000 ft.

Also in Norfolk Island, Australia, the Pacific islands, and Java. A most variable fern; in habit and general appearance often so close to *Phegopteris punctata* that the suspicion naturally arises that the two species may be forms of one plant, a view which is rendered more probable by the fact that the indusium is sometimes so feebly developed that the technical distinction separating *Hypolepis* and the *Phegopteris* section of *Dryopteris* is obliterated. Usually, however, *Polypodium punctatum* can be distinguished by the sori being farther from the margin and by the glandular-viscid rhachis and costae. Mr. Colenso's *Cheilanthes pellucida*, which is kept as a distinct variety in the "Species Filicum" (t. 90a), looks different at first sight on account of its stouter habit, broader and more obtuse pinnules, and more copious crisped hairs, but is connected with the type by numerous intermediates. I am sorry that I cannot maintain Mr. Carse's *H. Petrieana*, which I take to be a state not uncommon in many parts of the North Island.

2. **H. millefolium** *Hook. Sp. Fil.* ii (1858) 68, t. 95b.—Rhizome long, slender, creeping, naked or nearly so. Stipes 3–9 in. long, rigid, erect, yellow-brown, glossy, smooth or slightly scabrous, glabrous or sparingly pilose with crisped hairs. Fronds 6–18 in. long, 3–9 in. broad, broadly ovate or deltoid to ovate-lanceolate, pale-green when fresh, firm or almost rigid, 4-pinnatifid; rhachis and costae more or less clothed with scattered crisped hairs. Primary and secondary pinnae ovate-lanceolate, ascending; tertiary ⅕–½ in. long, ovate or oblong, cut down almost to the rhachis into several entire or sharply-toothed lobes; under-surface glabrous or slightly hairy. Sori numerous, small, roundish, placed under a small lobule in the sinuses of the pinnules. Indusium composed of the reflexed and almost unaltered tip of the lobule.—*Hook. f. Fl. Nov. Zel.* ii (1855) 23; *Handb. N.Z. Fl.* (1864) 361; *Hook. and Bak. Syn. Fil.* (1873) 130; *Thoms. N.Z. Ferns* (1882) 56; *Field N.Z. Ferns* (1890) 85, t. 3, f. 2; *Cheesem. Man. N.Z. Fl.* (1906) 965.

North Island: East Cape district, *Bishop Williams;* base of Ruapehu, *H. C. Field! Cockayne;* Mount Egmont, *Buchanan, H. C. Field, T. F. C.;* Ruahine

Mountains, *Colenso! Field;* Manawatu Gorge, *A. Hamilton;* Tararua Mountains, *W. Townson, B. C. Aston!* SOUTH ISLAND: Not uncommon in mountain districts throughout. STEWART ISLAND: Base of Table Hill, *Cockayne.* CAMPBELL ISLAND, ANTIPODES ISLAND: *Kirk, Cockayne.* Usually from 1500 to 4000 ft., but descends almost to sea-level in the south of Otago.

Well distinguished from any of the forms of *H. tenuifolia* by the finely and deeply cut pinnules. It does not extend beyond New Zealand.

3. **H. distans** *Hook. Sp. Fil.* ii (1858) 70, t. 95c.—Rhizome long, rigid, branched, clothed with red-brown linear scales. Stipes 3–9 in. long, slender, flexuous, fragile, red-brown, glossy, naked, minutely muricate. Fronds 6–15 in. long, 3–6 in. broad, ovate-lanceolate, acuminate, rigid, brownish-green or reddish-brown, 2-pinnate; rhachis slender, red-brown, glabrous or nearly so, scabrous like the stipes. Primary pinnae 2–3 in. long, about $\frac{1}{2}$ in. broad, opposite or nearly so, distant, spreading at right angles, lanceolate; secondary (pinnules) $\frac{1}{4}$ in. long, sessile, lanceolate, rigid, deeply pinnatifid. Ultimate segments ovate, spreading, toothed or incised. Sori 2–8 to a pinnule, placed in the lower sinuses. Indusium composed of the inflexed tip of a lobule, small, membranous.—*Hook. f. Fl. Nov. Zel.* ii (1855) 23; *Handb. N.Z. Fl.* (1864) 362; *Hook. and Bak. Syn. Fil.* (1873) 129; *Thoms. N.Z. Ferns* (1882) 56; *Field N.Z. Ferns* (1890) 85, t. 28, f. 6; *Cheesem. Man. N.Z. Fl.* (1906) 966.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: In forest districts from the North Cape to the south of Otago, not common, usually at low elevations.

Small and slender forms of *Dryopteris punctata* are easily mistaken for this; but in its usual state it is a smaller and more slender plant, with more distant pinnae, and the frond is never densely hairy or viscid-pubescent. It is confined to New Zealand.

26. **ADIANTUM** Linn.

Rhizome creeping or tufted. Stipes usually long, often black and glossy. Fronds pinnate or 2–3-pinnate, never pinnatifid, rarely simple (in a few species not found in New Zealand). Pinnules more or less dimidiate or unilateral. Veins forked or repeatedly dichotomous, frequently radiating from the petiole to the margin. Sori marginal, varying in shape from reniform or globose to oblong or linear, usually numerous and distinct, sometimes confluent and continuous. Indusium the same shape as the sorus, composed of the altered margin of the frond, which is reflexed and bears the sporangia on its under-side, opening inwards. Sporangia stalked, bursting transversely; ring vertical, incomplete.

A well-marked genus of about 160 species, found in all tropical and subtropical countries, but most abundant in tropical South America, a few species found in the temperate zones of both hemispheres. All the New Zealand species extend to Australia, and the majority to the Pacific islands as well, while one has a very wide distribution in warm climates generally.

A. Pinnules flabellate-cuneate, attached by the middle of the base.

Fronds 2–3-pinnate, thin and membranous, glabrous. Pinnules small, orbicular with a cuneate base .. .. .. 1. *A. aethiopicum.*

B. Pinnules one-sided, obliquely oblong or rhomboid, attached by the lower corner of the pinnule.

* Sori in the deep notches between the teeth or lobules of the pinnules.

Fronds small, tender, simply pinnate or with 1–2 branches at the base. Pinnules sparsely setulose, rarely glabrous .. .. 2. *A. diaphanum.*

Fronds dichotomous, each division flabellately divided into 3–7 branches. Rhachis densely hispid .. .. .. 3. *A. hispidulum.*

** Sori in shallow excavations at the tips of the lobules of the pinnae, not in the notches between the lobules.

Fronds very large and compound, 3–5 ft. high with the stipes. Rhachis pubescent above. Pinnules small, ¼–½ in. Sori transversely oblong	4. *A. formosum.*
Fronds 1–2 ft. with the stipes. Rhachis smooth, polished. Pinnules ½–1 in., not falcate, glaucous beneath	5. *A. affine.*
Fronds 1–2 ft. with the stipes. Rhachis and costae clothed with fulvous hairs. Pinnules ½–¾ in., subfalcate, frequently setulose, not glaucous beneath	6. *A. fulvum.*

1. **A. aethiopicum** *Linn. Sp. Plant.* (1759) 1329.—Rhizome creeping, stoloniferous. Stipes 4–10 in. long, very slender, dark chestnut-brown, shining, quite glabrous. Fronds 6–12 in. long, rarely more, 3–6 in. broad, oblong to oblong-ovate or oblong-deltoid, erect or drooping, pale-green, very thin and membranous, flaccid, quite glabrous, 3–4-pinnate; rhachis very slender, almost capillary, flexuous, polished. Lower pinnae 2–4 in. long, ovate-deltoid. Pinnules on rather long and slender petioles, not dimidiate, ¼–⅓ in. long, often broader than long, variable in shape, usually suborbicular with a more or less cuneate base, upper margin broadly and shallowly lobed. Pinnules of barren fronds often larger, entire or obscurely lobed. Sori 2–6 to a pinnule, placed in the notches or sinuses between the lobes. Indusium rather large, reniform or transversely oblong, pale.—*Hook. Sp. Fil.* ii (1858) 37, t. 77A; *Hook. f. Fl. Nov. Zel.* ii (1855) 21; *Handb. N.Z. Fl.* (1864) 360; *Hook. and Bak. Syn. Fil.* (1873) 123; *Benth. Fl. Austral.* vii (1878) 724; *Thoms. N.Z. Ferns* (1882) 54; *Field N.Z. Ferns* (1890) 83, t. 17, f. 1; *Cheesem. Man. N.Z. Fl.* (1906) 960. A. assimile *Swartz Syn. Fil.* (1806) 125; *Raoul Choix* (1846) 38. A. trigonum *Labill. Pl. Nov. Holl.* ii (1806) 99, t. 248; *Raoul Choix* (1846) 38.

North Island: Plentiful in lowland districts from the North Cape to the Thames and Waikato Rivers, from thence rare and local to Hawke's Bay (*Colenso!*) and Taranaki (*H. C. Field!*). South Island: Has been reported from Nelson and Canterbury, but I have seen no specimens. Westland—Buller River, near Westport, *Townson!*

An abundant fern in most tropical and subtropical countries.

2. **A. diaphanum** *Blume Enum.* (1828) 215.—Rhizome very short, tufted; rootlets long, fibrous, densely tomentose, bearing numerous small oblong tubers. Stipes 2–6 in. long, very slender, almost capillary, wiry, glabrous or slightly scaly towards the base, dark purplish-brown or almost black. Fronds 3–6 in. long, rarely more, simply pinnate, or with 1–2 branches at the base which are sometimes almost as long as the central portion but usually much shorter, thin and membranous, flaccid, dark-green; branches ½–1 in. diam. Pinnules numerous, shortly petiolate, ⅓–½ in. long, about ¼ in. deep, dimidiate-oblong; lower margin straight or more or less decurved, entire; upper margin about parallel, and together with the rounded apex deeply crenate-toothed; surfaces sparingly setulose with minute stiff black hairs. Sori 4–8 to a pinnule, rarely more, placed in the notches of the upper and outer margins. Indusium reniform, pale, minutely setulose.—*Hook. Sp. Fil.* ii (1858) 10, t. 80c; *Hook. and Bak. Syn. Fil.* (1873) 117; *Thoms. N.Z. Ferns* (1882) 53; *Field N.Z. Ferns* (1890) 80, t. 13, f. 5; *Cheesem. Man. N.Z. Fl.* (1906) 961. A. affine *Hook.*

Sp. Fil. ii (1858) 32; *Hook. f. Fl. Nov. Zel.* ii (1855) 20; *Handb. N.Z. Fl.* (1864) 360 (*not of Willd.*). A. setulosum *J. Smith in Comp. Bot. Mag.* (1846) 22.

Var. **polymorphum** *Cheesem.*—Fronds smaller, pale-greem, usually simply pinnate, rarely branched at the base. Surfaces of the pinnae and indusia quite glabrous.—A. polymorphum *Col. in Trans. N.Z. Inst.* xx (1888) 215. A. tuberosum *Col. l.c.* 217.

Kermadec Islands, North Island: Not uncommon in woods at low elevations, usually in rich alluvial soils. South Island: Apparently rare and local. Nelson—Bateman's Gully, *D. Grant;* Collingwood, *H. H. Travers;* Lake Tennyson, *Laing.* Canterbury—Gorge of the Rakaia, *Potts.* Otago—Various localities, *Buchanan, T. Kirk.* Sea-level to 1000 ft.

Also in Norfolk Island, east Australia, Fiji, New Caledonia, New Hebrides, Java, and southern China.

3. **A. hispidulum** *Swartz Syn. Fil.* (1806) 124.—Rhizome short, stout, creeping. Stipes 6–15 in. long, stout, erect, scabrous, dark-brown or almost black, more or less clothed with short greyish-white pubescence when young, becoming almost glabrous when old. Fronds broad, 6–12 in. or more across, dichotomously forked at the base, both forks irregularly flabellately divided into 3–7 linear secondary divisions 3–8 in. long by ½–¾ in. broad, colour olive-green, often red or reddish-brown when young, rhachises densely hispid-pubescent. Pinnules numerous, closely placed, petiolate, ⅓–⅔ in. long, about ¼ in. deep, dimidiate, rhomboidal, rigid, prominently nerved, more or less hispid, especially on the under-surface, upper margin and the obtuse tip finely toothed, lower margin entire. Sori numerous on each pinnule, contiguous, placed in the notches of the upper and outer margins. Indusium orbicular-reniform, minutely hispid.—*A. Rich. Fl. Nouv. Zel.* (1832) 88; *A. Cunn. Precur.* (1836) n. 209; *Raoul Choix* (1846) 38; *Hook. Sp. Fil.* ii (1858) 31; *Hook. f. Fl. Nov. Zel.* ii (1855) 22; *Handb. N.Z. Fl.* (1864) 360; *Hook. and Bak. Syn. Fil.* (1873) 126; *Benth. Fl. Austral.* vii (1878) 725; *Thoms. N.Z. Ferns* (1882) 55; *Field N.Z. Ferns* (1890) 82, t. 13, f. 1; *Cheesem. Man. N.Z. Fl.* (1906) 962. A. pubescens *Schkuhr Fil.* (1809) 108, t. 115; *A. Rich. Fl. Nouv. Zel.* (1832) 89. A. pedatum *Forst. f. Prodr.* (1786) n. 468 (*not of Linn.*).

Kermadec Islands, North Island: Abundant as far south as the East Cape and Raglan, from thence somewhat rare and local to Cook Strait. South Island: Nelson—Bishopdale, *D. Grant.*

The rather harsh hispid-pubescent fronds distinguish this from all the other New Zealand species. Outside New Zealand, it extends through the Pacific islands and Australia to tropical Asia and Africa.

4. **A. formosum** *R. Br. Prodr.* (1810) 155.—Rhizome long, stout, creeping, scaly. Stipes 1–3 ft. high, dark purplish-black or quite black, shining, sometimes hairy towards the base, scabrous throughout. Fronds 1½–3 ft. long, 12–20 in. broad, broadly deltoid, dark-green, copiously 3–4-pinnate; main rhachis flexuous, black, glossy, glabrous or pubescent; secondary rhachises usually pubescent. Lower pinnae large and broad, often 12–15 in. long, ascending, very compound; secondary pinnae usually again divided. Pinnules very numerous; fertile small, ¼–½ in. long, ⅕–¼ in. deep, petiolate, dimidiate, broadly obliquely-oblong or rhomboid; lower margin straight or slightly hollowed, entire, upper and the rounded outer margin deeply toothed or incised; texture firm; under-surface glabrous or pubescent with

scattered white hairs. Pinnules of the barren frond larger, often $\frac{3}{4}$ in. long or more, more membranous, upper and outer margins deeply lobulate, the lobules incised. Sori numerous, placed in shallow depressions at the top of the teeth or lobules, broader than long, transversely oblong or oblong-reniform.—*Hook. Sp. Fil.* ii (1858) 51, t. 86B; *Hook. f. Fl. Nov. Zel.* ii (1855) 21; *Handb. N.Z. Fl.* (1864) 360; *Hook. and Bak. Syn. Fil.* (1873) 119; *Benth. Fl. Austral.* vii (1878) 724; *Thoms. N.Z. Ferns* (1882) 54; *Field N.Z. Ferns* (1890) 81, t. 6; *Cheesem. Man. N.Z. Fl.* (1906) 962.

North Island: Auckland—Alluvial banks of the Northern Wairoa River, from Tangiteroria to a few miles above Dargaville, *T. F. C.* Wellington—Manawatu River and its tributaries, from Woodville to below Palmerston North, *Colenso! Enys! Field! Hamilton!* &c.

Also a native of eastern Australia. Easily recognized by its large size, decompound fronds, and numerous small somewhat rigid pinnules.

A. cunninghamii Hook. --- C. Chr. Index Filicum 1906:25

5. **A. affine** *Willd. Sp. Plant.* v (1810) 448.—Rhizome long, creeping, stout, clothed with glossy dark chestnut-brown scales. Stipes 4–12 in. long or more, stout, erect, shining-black, rough and scaly at the very base, smooth and polished above. Fronds 6–15 in. long, 3–9 in. broad, ovate-deltoid in outline, bipinnate or tripinnate at the base, pale-green above, usually glaucous beneath, quite glabrous or the secondary rhachises pubescent above. Pinnae 2–3 pairs with a long terminal one sometimes 6–9 in. long, in large specimens the lowest pair again branched. Pinnules $\frac{1}{2}$–1 in. long, $\frac{1}{4}$–$\frac{1}{2}$ in. deep, petiolate, dimidiate, broadly obliquely-oblong or rhomboidal; lower margin straight, entire, base truncate; upper margin and the obtusely rounded apex deeply crenate-toothed; texture firm, subcoriaceous. Sori numerous, rather large, 6–14 to a pinnule, placed in small notches at the tips of the lobes of the upper and outer margins, not in the sinuses between the lobes. Indusium orbicular-cordate or reniform.—*Hook. and Bak. Syn. Fil.* (1873) 117; *Benth. Fl. Austral.* vii (1878) 724; *Thoms. N.Z. Ferns* (1882) 53; *Field N.Z. Ferns* (1890) 80, t. 6, f. 1; *Cheesem. Man. N.Z. Fl.* (1906) 963. A. Cunninghamii *Hook. Sp. Fil.* ii (1858) 52, t. 86A; *Hook. f. Fl. Nov. Zel.* ii (1855) 21; *Handb. N.Z. Fl.* (1864) 360. A. formosum *A. Rich. Fl. Nouv. Zel.* (1832) 88; *A. Cunn. Precur.* (1836) n. 208; *Raoul Choix* (1846) 38 (*not of R. Br.*). A. pullum *Col. in Trans. N.Z. Inst.* (1873) 319.

Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Abundant in lowland districts throughout.

Also in Australia, according to Bentham (Fl. Austral. vii (1878) 724). Very variable in size, the amount of branching of the frond, and in the size and shape of the pinnules. When growing on exposed rock-faces it is often dwarfed to an inch or two. Most of the Chatham Islands specimens that I have seen are less compound, with larger and coarser narrower pinnules, corresponding, I presume, with the variety *Chathamicum* of Mr. Field (N.Z. Ferns, 81). A curious form gathered by Mr. Hamilton on limestone crags at Moteo, near Puketapu, Hawke's Bay, has the tips of the pinnae largely cristate, and the pinnules very irregular in shape. It is the *A. Cunninghamii* var. *heterophyllum* of Colenso (Trans. N.Z. Inst. xx (1888) 218). States with the secondary rhachises somewhat pubescent above, and with rather narrower and more acute pinnules, seem to show a marked approach to *A. fulvum*.

6. **A. fulvum** *Raoul Choix* (1846) 9.—Rhizome long, creeping, clothed with brownish subulate scales. Stipes 4–12 in. long, erect, dark reddish-brown or almost black, rough with minute projections throughout, more or less scaly towards the base. Fronds 6–15 in. long, 3–9 in. broad, ovate-deltoid in outline, 2–3-pinnate or rarely in large specimens 4-pinnate

at the base, olive-green or pale-green, not glaucous beneath; rhachis and costae more or less densely clothed above with strigose fulvous hairs. Pinnae 2–4 pairs with a long terminal one, in small specimens not branched, in larger ones the lowest pair and sometimes all again divided, or rarely the lowest pair twice branched. Pinnules $\frac{1}{2}$–$\frac{3}{4}$ in. long, about $\frac{1}{4}$ in. deep, petiolate, dimidiate, obliquely oblong, often slightly falcate; lower margin curved or nearly straight, entire; upper margin almost parallel, deeply crenate; lower surface often minutely setulose with stiff fulvous hairs; texture firm but not coriaceous. Sori usually numerous in shallow notches at the tips of the lobes of the upper and outer margins, not in the sinuses between the lobes. Indusium orbicular-cordate, often pale when young.—*Hook. Sp. Fil.* ii (1858) 52, t. 85A; *Hook. f. Fl. Nov. Zel.* ii (1855) 22; *Handb. N.Z. Fl.* (1864) 361; *Hook. and Bak. Syn. Fil.* (1873) 120; *Thoms. N.Z. Ferns* (1882) 54; *Field N.Z. Ferns* (1890) 81, t. 6, f. 4; *Cheesem. Man. N.Z. Fl.* (1906) 964. A. viridescens *Col. in Trans. N.Z. Inst.* xxvii (1895) 400.

North and South Islands: Lowland districts as far south as Banks Peninsula, not uncommon.

Very close indeed to *A. affine*, with which it certainly seems to me to be connected by intermediate forms. It is more copiously branched, the rhachis and costae are clothed with strigose fulvous hairs, the stipes is minutely muricate, and the pinnules are narrower and subfalcate, and often setulose beneath. It is also found in Norfolk Island, New South Wales, and Fiji.

27. **PTERIS** Linn.

Rhizome usually creeping. Fronds of very various habit, generally much divided, often of large size. Veins free or more or less copiously anastomosing. Sori marginal, linear, continuous, placed on a slender receptacle running along the edge of the frond, and joining the tips of the transverse veinlets. Indusium long, narrow, continuous, always single, composed of the more or less modified and membranous reflexed margin of the frond. Sporangia stalked, bursting transversely, girt by an incomplete vertical ring. Spores tetrahedral.

Although this genus has been reduced in size by the separation of a number of small groups formerly included in it, it still contains at least 125 species. These are widely spread in the tropics of both hemispheres, but few extending into the Temperate Zones. Of the 3 New Zealand species, 1 is endemic; the remaining 2 are found in Australia, Tasmania, and Norfolk Island.

Veins free. Fronds 1–3 ft., membranous, glabrous. Segments $\frac{1}{2}$–$1\frac{1}{2}$ in. long, obtuse .. .. 1. *P. tremula.*

Veins anastomosing. Fronds 2–4 ft., dark-green, 2-pinnate or rarely 3-pinnate. Segments of the pinnules lanceolate or linear-lanceolate, 1–3 in. long, entire or toothed at the tip .. .. .. 2. *P. comans.*

Veins anastomosing. Fronds 1–3 ft., pale-green, 2–4-pinnate. Pinnules remote, stalked, ovate or deltoid, deeply lobed.. .. 3. *P. macilenta.*

[*P. lomarioides* Col. in Trans. N.Z. Inst. xiii (1880) 380, said to have been collected near Tapuaeharuru, Taupo, is proved by the type specimen in Mr. Colenso's herbarium to be the widely distributed *P. cretica* Linn. Although it is just possible that the species may exist near some of the hot springs at Taupo, where other tropical ferns, such as *Gleichenia dichotoma, Nephrodium unitum* and *N. molle* are known to grow, still, as the locality has been repeatedly searched without success, the most prudent course is to wait for further evidence before introducing the species into the Flora. The same course must be followed with respect to *P. longifolia* Linn., an equally widely spread

plant, stated by Mr. Buchanan (Trans. N.Z. Inst. xiv (1882) 356) to have been gathered at Tarawera, between Napier and Taupo, but of which there are no indigenous specimens in any New Zealand herbarium.]

1. **P. tremula** *R. Br. Prodr.* (1810) 154.—Rhizome short, stout, suberect, putting up numerous tufted erect fronds. Stipes 1–2 ft. long, stout, erect, quite glabrous, smooth and polished, bright chestnut-brown, darker at the base. Fronds 1–3 ft. long or more, 6–24 in. broad, ovate or ovate-deltoid, acuminate, bright-green, herbaceous, quite glabrous, 2–4-pinnate; rhachis smooth, naked. Primary pinnae 6–12 pairs, subopposite; the lowest 6–15 in. long, ovate-lanceolate or ovate-deltoid, usually bipinnate, sometimes tripinnate; upper gradually becoming shorter and narrower and less compound; the uppermost linear, pinnate or pinnatifid. Ultimate segments ½–1½ in. long, $\frac{1}{10}$–$\frac{1}{6}$ in. broad, linear or linear-oblong, obtuse, sessile and decurrent at the base; fertile usually entire or slightly crenate at the tips; barren generally broader and with the margins crenate throughout; veins free, forked. Sori copious, usually continuous on both the upper and lower edges of the segments, rarely interrupted.—*Hook Sp. Fil.* ii (1858) 174, t. 120B; *Hook. f. Fl. Nov. Zel.* ii (1855) 25; *Handb. N.Z. Fl.* (1864) 364; *Hook. and Bak. Syn. Fil.* (1873) 161; *Benth. Fl. Austral.* vii (1878) 731; *Thoms. N.Z. Ferns* (1882) 60; *Field N.Z. Ferns* (1890) 90, t. 23, f. 2; *Cheesem. Man. N.Z. Fl.* (1906) 971. P. affinis *A. Rich. Fl. Nouv. Zel.* (1832) 81; *A. Cunn. Precur.* (1836) n. 201; *Raoul Choix* (1846) 38. P. tenuis *A. Cunn. Precur.* (1836) n. 205. P. Kingiana *Endl. Prodr. Fl. Insl. Norfolk* (1833) 13.

Kermadec Islands, North Island: Abundant, ascending to 2500 ft. South Island: In various localities in Nelson and Marlborough, but not common; recorded from Banks Peninsula by Armstrong and Potts.

Also in Australia and Tasmania, Norfolk Island, Lord Howe Island, and Fiji Very variable in the size and shape of the ultimate segments. *P. Kingiana* (var. *Kingiana* Hook. and Bak. Syn. Fil. (1873) 161) sometimes has them over 1½ in. long and more than ¼ in. broad; while in *P. tenuis* A. Cunn. they are very narrow, the sori occupying the whole under-surface except the costa.

2. **P. comans** *Forst. f. Prodr.* (1786) n. 419.—Rhizome short, stout, suberect. Stipes 1–2 ft. long or more, erect, yellow-brown, polished, naked or clothed at the base with dark-brown scales. Fronds 1–4 ft. long, ½–3 ft. broad, broadly deltoid, acuminate, membranous, dark-green, quite glabrous, 2-pinnate or rarely 3-pinnate at the base; rhachis smooth, polished. Lower pinnae in large specimens nearly 2 ft. long by 1 ft. broad and bipinnate, but usually from 9–18 in. and pinnate, shortly stalked; upper pinnae gradually becoming shorter and narrower, oblong-lanceolate or lanceolate, regularly pinnatifid; terminal pinna 6–9 in. long, cut down almost to the rhachis. Ultimate segments variable in size and shape, 1–3 in. long, ¼–½ in. broad, lanceolate or linear-lanceolate to linear-oblong, acute or obtuse, straight or falcate, the fertile ones serrate at the tips or sinuate-serrate or sinuate-lobed, sinus between the segments acute. Veins anastomosing copiously. Sori continuous, but not reaching the apex of the segments.—*A. Rich. Fl. Nouv. Zel.* (1832) 79; *A. Cunn. Precur.* (1836) n. 199; *Raoul Choix* (1846) 38; *Hook. Sp. Fil.* ii (1858) 219; *Hook. f. Fl. Nov. Zel.* ii (1855) 26; *Hook. and Bak. Syn. Fil.* (1873) 171; *Benth. Fl. Austral.* vii (1878) 733; *Thoms. N.Z. Ferns* (1882) 62; *Field N.Z. Ferns* (1890) 95, t. 24, f. 1; *Cheesem. Man. N.Z. Fl.* (1906) 972. P. Endlicheriana *Aghard*

Sp. Pterid. (1839) 66 ; *Hook. Ic. Plant.* (1854) t. 973 ; *Sp. Fil.* ii (1858) 218 ; *Hook. f. Handb. N.Z. Fl.* (1864) 364. Litobrochia comans *Presl Tent. Pteridogr.* (1836) 66.

Kermadec Islands : Most abundant, *McGillivray, T. F. C., Oliver.* North Island : From the Three Kings Islands and the North Cape southwards to the Bay of Plenty, usually in shaded places near the sea, plentiful on the outlying islands, rare and local on the mainland.

This is often confounded by fern-collectors with large states of *P. macilenta* var. *pendula*, but is an altogether different plant, with a coarser and stouter habit of growth, much-broader less-divided fronds, and usually long and narrow segments, with the venation more copiously anastomosing. It is also found in Australia, Tasmania, and the Pacific islands.

3. **P. macilenta** *A. Rich. Fl. Nouv. Zel.* (1832) 82, t. 11.—Rhizome very short, suberect, clothed with the bases of the old stipites. Stipes 6–12 in. long, pale yellow-brown, becoming darker towards the base, smooth or slightly scaly below. Fronds 1–3 ft. long, 9–18 in. broad, broadly ovate or deltoid, membranous, flaccid, pale-green and glistening, quite glabrous, 2–3-pinnate ; rhachis smooth, stramineous. Primary pinnae numerous, distant, the lower ones 6–12 in. long, the upper gradually shorter ; terminal pinna 1–3 in. long, acuminate, deeply pinnatifid. Secondary pinnae stalked, those on the lower branches again pinnate, on the upper pinnatifid. Pinnules 1–2 in. long, scattered, often remote, stalked, ovate or deltoid, cuneate at the base, pinnatifid, the terminal ones adnate and decurrent. Ultimate segments oblong or ovate, deeply and coarsely toothed or incised at the apex. Veins anastomosing along the costa, free elsewhere. Sori in the notches between the segments, short, not nearly reaching the tips of the segments.—*A. Cunn. Precur.* (1836) n. 202 ; *Raoul Choix* (1846) 38 ; *Hook. Sp. Fil.* ii (1858) 219 ; *Hook. f. Fl. Nov. Zel.* ii (1855) 26 ; *Handb. N.Z. Fl.* (1864) 364 ; *Hook. and Bak. Syn. Fil.* (1873) 171 ; *Thoms. N.Z. Ferns* (1882) 61 ; *Field N.Z. Ferns* (1890) 94, t. 7, f. 1 ; *Cheesem. Man. N.Z. Fl.* (1906) 973. Litobrochia macilenta *Brack. in U.S. Expl. Exped.* (1854) 106.

Var. **saxatilis.**—*Carse in Trans. N.Z. Inst.* li (1919) 95.—Smaller and thinner than the type, decumbent or suberect. Pinnules much smaller, more deeply toothed, the tips of the segments often laciniate.

Var. **pendula.**—Not so finely divided. Terminal pinna larger, 3–5 in. long, often caudate. Pinnules larger, 2–2½ in. long, ovate, acuminate ; segments longer and narrower.—P. pendula *Col. in Trans. N.Z. Inst.* xx (1888) 218.

North Island : The type and varieties not uncommon throughout in dry woods. South Island : Nelson—Near Nelson, *T. F. C. ;* Takaka, *Kingsley.* Marlborough—*Buchanan.* Also said to occur on Banks Peninsula and near Greymouth, but I have seen no specimens.

28. **HISTIOPTERIS** Aghard.

Rhizome long, stout, creeping. Fronds tall, 1–8 ft. high, erect, sometimes almost subscandent, smooth and glaucous beneath, 2–3-pinnate. Primary pinnae horizontally spreading, opposite and sessile ; ultimate divisions entire or sinuate or pinnatifid. Venation very variable, sometimes wholly free or partly united, at others altogether anastomosing. Sori marginal, linear, placed on a slender receptacle connecting the tips of the veins or their anastomoses. Indusium single, formed of the reflexed margin of the frond, membranous. Sporangia stalked, bursting transversely. Spores bilateral.

A small genus of one or two species, widely distributed through the tropics and the South Temperate Zone, extending southwards to the Subantarctic islands. It is very closely allied to *Pteridium*, from which it chiefly differs in the venation, and in the absence of the inner indusium.

1. **H. incisa** *J. Smith Hist. Fil.* (1875) 352.—Rhizome long, creeping, rather slender, smooth, producing numerous scattered fronds. Stipes 1–3 ft. high or more, stout, erect, smooth and glossy, yellow-brown or red-brown when mature, often glaucous when young, naked or slightly scabrous at the base. Fronds variable in size, 2–4 ft. long, broadly deltoid or ovate-deltoid to ovate-lanceolate, membranous when young, firm in age, quite smooth and glabrous, glaucous-green, 2–3-pinnate ; rhachis pale chestnut-brown, smooth and polished. Primary pinnae large, 6–12 in. long or more, ovate-lanceolate, opposite or nearly so, rather distant, sessile, the opposite pairs often almost connate at the base, 2-pinnatifid or the uppermost simply pinnate. Secondary pinnae lanceolate, deeply pinnatifid, sometimes pinnate at the base. Ultimate segments oblong or oblong-deltoid, obtuse, those of the barren fronds often sinuate-dentate or lobed. Veins sometimes all free, but usually more or less anastomosing near the costa of the pinnules. Sori continuous or interrupted, seldom reaching either the base or apex of the segment.—Pteris incisa *Thunb. Fl. Cap.* (1800) 171 ; *Hook. Sp. Fil.* ii (1858) 230 ; *Hook. f. Handb. N.Z. Fl.* (1864) 364 ; *Hook. and Bak. Syn. Fil.* (1873) 172 ; *Benth. Fl. Austral.* vii (1878) 732 ; *Thoms. N.Z. Ferns* (1882) 62 ; *Field N.Z. Ferns* (1890) 96, t. 8, f. 4 ; *Cheesem. Man. N.Z. Fl.* (1906) 973. P. vespertilionis *Labill. Pl. Nov. Holl.* ii (1806) 96, t. 245 ; *Hook. f. Fl. Antarct.* i (1844) 110 ; *Fl. Nov. Zel.* ii (1855) 26. P. Brunoniana *Endl. Prodr. Insl. Norfolk* (1833) 12 ; *A. Cunn. Precur.* (1836) n. 202 ; *Raoul Choix* (1846) 38. P. montana *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 172. Litobrochia incisa and L. vespertilionis *Presl Tent. Pterid.* (1836) 149.

North and South Islands, Stewart Island, Chatham Islands, Auckland and Campbell Islands, Antipodes Island : Abundant throughout, often forming thickets on the skirts of woods, &c. Sea-level to 3000 ft.

Universally spread through the tropics and the South Temperate Zone. In New Zealand it attains exceptional luxuriance by the margins of hot springs in the Rotorua and Taupo districts, in some localities reaching a height of 12 ft.

29. **PTERIDIUM** Gled.

Rhizome stout, creeping, subterranean. Stipites strong, stout, erect and rigid, often remote from one another. Fronds large, broad, deltoid, much divided, 3–4-pinnate. Veins simple or forked, never anastomosing. Sori marginal, linear, continuous, placed on a slender receptacle connecting the tips of the veins. Indusium double ; the outer one formed of the reflexed margin of the frond, membranous, usually villous or ciliated ; the inner less evident, arising from the inner side of the receptacle, sometimes obsolete. Sporangia stalked, bursting transversely, girt by an incomplete vertical ring.

Treated in the sense of the " Pflanzenfamilien " and Christensen's " Index Filicum," this is a genus composed of a single highly variable and widely spread species ; but some authors split it into four or five closely related forms. It is mainly distinguished from *Pteris* proper by the distinctly double indusium.

1. **P. aquilinum** *Kuhn in Deck. Reis. Bot.* iii (1879) 11 ; *var.* **esculenta** *Hook f. Fl. Nov. Zel.* ii (1855) 25.—Rhizome stout, as thick as the finger, creeping, much branched, often matted, subterranean, producing numerous scattered fronds. Stipes variable in length, stout, rigid, erect, brown, smooth and shining. Fronds usually from 2–6 ft. long including the stipes, but often taller and sometimes 10–12 ft., broadly deltoid in outline, coriaceous, glabrous or nearly so when mature, usually more or less rusty-pubescent when young, especially on the under-surface, 3–4-pinnate ; rhachises grooved above, usually pubescent. Primary pinnae broad, distant, spreading, the lowest pair the largest and most compound, the upper ones gradually decreasing in size ; secondary and tertiary lanceolate, always terminating in a linear obtuse undivided segment. Ultimate segments linear or linear-oblong, decurrent at the base. Veins free, once or twice forked. Sori usually continuous all round the segment, and often extending to the decurrent base. Indusium double, but the inner one often very inconspicuous.—*Hook. Sp. Fil.* ii (1858) 197, t. 141B ; *Hook. f. Handb. N.Z. Fl.* (1864) 353 ; *Hook. and Bak. Syn. Fil.* (1873) 163 ; *Benth. Fl. Austral.* vii (1878) 731 ; *Thoms. N.Z. Ferns* (1882) 60 ; *Field N.Z. Ferns* (1890) 92, t. 14, f. 1, 1A ; *Cheesem. Man. N.Z. Fl.* (1906) 970. P. esculenta *Forst. f. Prodr.* (1786) n. 488 ; *Pl. Escul.* (1786) 74 ; *A. Rich. Fl. Nouv. Zel.* (1832) 79 ; *A. Cunn. Precur.* (1836) n. 200 ; *Raoul Choix* (1846) 38.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS : Abundant throughout, except in dense forest, often covering extensive areas, especially in the North Island. *Common fern ; Bracken ; Rau-aruhe ; Rahurahu ;* of the root *Aruhe, Roi.* Sea-level to 4000 ft.

P. aquilina, in some of its forms, is almost cosmopolitan ; the variety *esculenta,* which chiefly differs in the decurrent bases of the pinnules, is confined to the Southern Hemisphere. The starchy rhizome formerly constituted one of the chief vegetable foods of the Maoris. For an account of the mode of its preparation, and many interesting particulars concerning its use, reference should be made to Mr. Colenso's paper " On the Vegetable Food of the Ancient New-Zealanders " (Trans. N.Z. Inst. xiii, pp. 1–38).

30. **PAESIA** St. Hil.

Rhizome long, creeping, scaly. Stipes stiff, erect ; rhachis often more or less flexuose. Frond finely divided, 3–4-pinnate, usually glandular-scabrous or -villous ; ultimate segments deeply lobed or toothed. Veins free. Sori marginal, linear, placed on a slender receptacle connecting the tips of the veins. Indusium usually double ; the outer one formed of the reflexed margin of the frond ; the inner, when present, arising from the inner side of the receptacle. Sporangia stalked, bursting transversely ; girt by an incomplete vertical ring. Spores bilateral.

A small genus of six or seven species distributed through the southern tropics. It is very closely allied to *Pteridium,* and might well be incorporated with it, as in fact was done in the " Synopsis Filicum." The single New Zealand species is endemic.

1. **P. scaberula** *Kuhn Chaetopt.* (1882) 347.—Rhizome wide-creeping, rigid, wiry, clothed with chestnut-brown scales. Stipes 4–12 in. long, rigid, erect, yellow-brown or chestnut-brown, scabrous, glandular-pubescent and usually more or less bristly. Fronds 9–18 in. high, rarely more, 4–9 in. broad, ovate or ovate-lanceolate, acuminate, rigid, coriaceous, pale yellow-green, usually copiously glandular-pubescent on both surfaces, rarely almost

glabrate; rhachis scabrous, flexuous. Primary pinnae numerous, the lowest pair often distant, lanceolate or ovate-lanceolate, 3–9 in. long; secondary lanceolate. Ultimate divisions small, $\frac{1}{10}$–$\frac{1}{4}$ in. long, stipitate, acute, entire or the barren ones toothed or incised, often lobed or pinnatifid at the base; veins obscure. Sori copious, when mature usually covering the whole segment except the costa and the extreme tip and base.—Pteris scaberula *A. Rich Fl. Nouv. Zel.* (1832) 82, t. 11; *A. Cunn. Precur.* (1836) n. 204; *Raoul Choix* (1846) 38; *Hook. Sp. Fil.* ii (1858) 174, t. 93A; *Hook. f. Fl. Nov. Zel.* ii (1855) 25; *Handb. N.Z. Fl.* (1864) 364; *Hook and Bak. Syn. Fil.* (1873) 163; *Thoms. N.Z. Ferns* (1882) 61; *Field N.Z. Ferns* (1890) 94, t. 19, f. 5; *Cheesem. Ill. N.Z. Fl.* ii (1914) t. 239. P. microphylla *A. Cunn. Precur.* (1836) n. 206; *Raoul Choix* (1846) 48. Allosurus scaberulus *Presl Tent. Pterid.* (1836) 154.

North and South Islands, Stewart Island, Chatham Islands: Abundant throughout, usually on bank-sides, or in dry open places in woods. Sea-level to 2500 ft.

Easily distinguished from its allies in New Zealand by the finely divided frond and minute coriaceous pinnules. In the North Island it quickly takes possession of the sides of road-cuttings in forest districts, often to the exclusion of other vegetation.

31. **POLYPODIUM** Linn.

Rhizome short and tufted, or long and creeping. Stipes jointed on to the rhizome, not continuous with it. Fronds very variable in size, shape, and cutting, simple or pinnatifid or pinnate in the New Zealand species. Veins free or copiously anastomosing. Sori globose or oblong, placed on the back of the frond, either at the tip of a vein or on the back of one. Indusium wanting. Sporangia stalked, surrounded by an incomplete vertical ring, bursting transversely.

In this work I have followed the circumscription of *Polypodium* adopted by Diels in the "Pflanzenfamilien," and by Christensen in the "Index Filicum." This differs from the *Polypodium* of Hooker and Baker in the excision of all those species that have the stipes continuous with the rhizome, or, in other words, belong to the Desmobryoid series of ferns. All these are now placed with their nearest allies in the genus *Dryopteris*, a name which, under the law of priority, takes the place of the better known *Nephrodium*. Some smaller groups of species have also been removed from the genus for reasons that need not be particularized here. Notwithstanding these losses, the genus *Polypodium* still remains the largest among ferns, numbering over seven hundred species. Of the six species found in New Zealand, one (*P. novae-zealandiae*) is endemic; another (*P. dictyopteris*) is also found in the New Hebrides; a third species (*P. Billardieri*) has a wide distribution in the South Temperate Zone; while the remaining three occur in Australia, Tasmania, and Norfolk Island.

* *Veins all free.*

Rhizome short. Fronds small, 1–6 in., quite entire. Sori oblong or linear-oblong, oblique to the midrib .. .. 1. *P. Billardieri.*

Rhizome short. Fronds 3–9 in., irregularly pinnatifid or 2-pinnatifid; pinnae linear. Sori oblong or rounded .. 2. *P. grammitidis.*

** *Veins copiously anastomosing.*

Rhizome short. Fronds 4–12 in., tufted, lanceolate, simple and entire .. .. 3. *P. dictyopteris.*

Rhizome long, slender, clothed with squarrose scales. Fronds 6–18 in., simple or pinnatifid, membranous; segments narrow .. .. 4. *P. pustulatum.*

Rhizome long, stout, clothed with appressed scales. Fronds 6–18 in., simple or pinnatifid, coriaceous; segments broad .. .. 5. *P. diversifolium.*

Rhizome long, stout, clothed with spreading scales. Fronds 1–4 ft., pinnatifid or pinnate, thinly coriaceous; segments usually narrow .. .. 6. *P. novae-zealandiae.*

1. **P. Billardieri** *C. Christen. Ind. Fil.* (1906) 513.—Rhizome very short, or erect or oblique and lengthened to ½–1½ in. long, crowned with copious pale chestnut-brown scales; rootlets long, wiry, densely hairy; often several rhizomes and their rootlets are matted together in the same tuft. Fronds numerous, crowded towards the end of the rhizome, erect, 1–6 in. long, ⅙–⅓ in. broad, linear-lanceolate or narrow-oblanceolate or linear-spathulate, quite entire, obtuse at the tip, very gradually narrowed into a short winged stipes, dark-green, coriaceous, glabrous or sparingly ciliate with short whitish hairs towards the base. Veins obscure, hidden in the substance of the frond. Sori in a single row on each side of the midrib and nearer to it than to the margin, oblique to the midrib, usually numerous, rather large, oblong or linear-oblong, often confluent when old.—P. australe *Mett. Polyp.* 36; *Hook. Sp. Fil.* iv (1862) 167; *Hook. f. Handb. N.Z. Fl.* (1864) 380; *Hook. and Bak. Syn. Fil.* (1873) 322; *Benth. Fl. Austral.* vii (1878) 762; *Thoms. N.Z. Ferns* (1882) 87; *Field N.Z. Ferns* (1890) 138, t. 22, f. 1; *Cheesem. Man. N.Z. Fl.* (1906) 1010. Grammitis Billardieri *Willd. Sp. Plant.* v (1810) 139. G. australis *R. Br. Prodr.* (1810) 146; *A. Cunn. Precur.* (1836) n. 172; *Raoul Choix* (1846) 37; *Homb. et Jacq. Voy. au Pôle Sud* (1852) *Crypt.* t. 2G; *Hook. f. Fl. Antarct.* i (1844) 111; *Fl. Nov. Zel.* ii (1855) 44. G. rigida *and* G. humilis *Homb. et Jacq. l.c.* (1852) t. 2, F, H.

Var. **villosum** *Hook. f. Fl. Nov. Zel.* ii (1855) 44.—Stipes, margins, and undersurface of the fronds more or less villous with long spreading rufous or whitish hairs, often partially concealing the sori.—P. paradoxum *Col. in Trans. N.Z. Inst.* xiv (1882) 336. Grammitis ciliata *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 166.

Var. **pumilum** *Cheesem.*—Small, very densely matted; rhizomes stout, creeping, sometimes 1–2 in. long. Fronds ⅛–¾ in. long, obovate or spathulate, obtuse, narrowed to the base, very thick and coriaceous, glabrous or obscurely pubescent beneath. Sori usually solitary near the tip of the frond, large, roundish.—P. crassium *Kirk in Trans. N.Z. Inst.* xvii (1885) 232. Grammitis pumila *Armstr. in Trans. N.Z. Inst.* xiii (1879) 314. P. pumilum *Cockayne Bot. Stewart Is.* (1909) 47.

North and South Islands, Stewart Island, Auckland and Campbell Islands, Antipodes Island, Macquarie Island: The typical state and var. *villosum* not uncommon throughout on rocks or trunks of trees; var. *pumilum* in mountain districts from the East Cape southwards, ascending to over 5000 ft.

A very variable little plant, also found in Australia and Tasmania, South Africa, Chile, Fuegia, Tristan d'Acunha, and Marion Island.

2. **P. grammitidis** *R. Br. Prodr.* (1810) 147.—Rhizome short, tufted, crowned with subulate-lanceolate scales; roots long, fibrous. Stipes short, wiry, naked, 1–2 in. long. Fronds tufted at the top of the rhizome, very variable in size and shape, 3–9 in. long, 1–3 in. broad, lanceolate to oblong-lanceolate or narrow-ovate, acuminate, sometimes caudate, dark-green, coriaceous, quite glabrous, pinnatifid almost to the rhachis. Pinnae often unequal, linear, decurrent on the rhachis at the base and confluent; in large states 1–3 in. long, ⅙–⅓ in. broad, deeply lobed or pinnatifid; in small forms shorter, entire or sinuate or shortly lobed; rarely the pinnae are

reduced to short triangular lobes, so that the frond is narrow-linear in outline. Veins obscure, simple or forked. Sori oblong or rounded, usually one at the base of each segment of the pinnae, more rarely 2–4 to a segment.—*A. Cunn. Precur.* (1836) n. 177; *Raoul Choix* (1846) 37; *Hook. Sp. Fil.* iv (1862) 230; *Hook. f. Fl. Antarct.* i (1844) 111; *Fl. Nov. Zel.* ii (1855) 41; *Handb. N.Z. Fl.* (1864) 380; *Hook. and Bak. Syn. Fil.* (1873) 327; *Benth. Fl. Austral.* vii (1878) 764; *Thoms. N.Z. Ferns* (1882) 88; *Field N.Z. Ferns* (1890) 139, t. 14, f. 3; *Cheesem. Man. N.Z. Fl.* (1906) 1011. Grammitis heterophylla *Labill. Pl. Nov. Holl.* ii (1806) 90, t. 239.

North and South Islands, Stewart Island, Chatham Islands, Auckland and Campbell Islands: From the North Cape southwards, abundant in forests on the trunks of trees, more rarely on rocks. Sea-level to 3500 ft.

Also in Tasmania and Victoria.

3. **P. dictyopteris** *Metten. in. Ann. Sci. Nat.* xv (1861) 72.—Rhizome small, short, knot-like, densely clothed with brownish lanceolate scales, emitting woolly rootlets, some of which creep and produce new tufts of fronds. Fronds tufted at the top of the rhizome, 4–12 in. long, $\frac{2}{3}$–$\frac{3}{4}$ in. broad, lanceolate or linear-lanceolate, acuminate, very gradually narrowed to the base or to a short stipes, quite entire, bright-green, rather fleshy but hardly coriaceous, quite glabrous; midrib stout, evident. Veins hidden in the substance of the frond, anastomosing, forming elongated hexagonal areoles without included free veinlets. Sori large, broadly oblong or rounded, prominent, rather far apart, in a single row on each side of the frond, nearer the midrib than the margin.—P. Cunninghamii *Hook. Sp. Fil.* v (1864) 58; *Hook. f. Handb. N.Z. Fl.* (1864) 381; *Hook. and Bak. Syn. Fil.* (1873) 354; *Thoms. N.Z. Ferns* (1882) 89; *Field N.Z. Ferns* (1890) 141, t. 15, f. 5; *Cheesem. Ill. N.Z. Fl.* ii (1914) t. 246. P. attenuatum *A. Rich. Fl. Nouv. Zel.* (1832) 62; *A. Cunn. Precur.* (1836) n. 173; *Raoul Choix* (1846) 37; *Hook. Ic. Plant.* (1842) t. 409 (*not of R. Br.*). Dictymia lanceolata *J. Smith in Bot. Mag.* 72, *Comp.* (1846) 16; *Hook. f. Fl. Nov. Zel.* ii (1855) 43. Dictyopteris lanceolata *J. Smith Gen. Ferns.*

North Island: In forests from the North Cape to Cook Strait, not uncommon, usually on the trunks of trees or on rocks. South Island: Nelson–Maitai Valley, *T. F. C.* Marlborough—*Buchanan.* Canterbury—Akaroa, *Raoul.* Sea-level to 2500 ft.

Also in the New Hebrides. I have seen no specimens from the south of Nelson. Mr. Phillips Turner sends me a curious crested form obtained near Wellington.

4. **P. pustulatum** *Forst. f. Prodr.* (1786) n. 436.—Rhizome very long, much branched, climbing up the trunks of trees or over rocks, everywhere clothed with squarrose linear-subulate dark-brown scales. Stipites scattered along the rhizome, 2–4 in. long, firm, slender, glabrous. Fronds very variable in size and outline, dark-green, thin and membranous, quite glabrous, sometimes 3–9 in. long, $\frac{1}{3}$–$\frac{2}{3}$ in. broad, linear-lanceolate, acuminate, gradually narrowed into the stipes, quite entire; at other times 6–18 in. long, 2–6 in. broad, cut down to a broadly winged rhachis into few or many linear-lanceolate acuminate segments; segments rather distant, 1–3 in. long, $\frac{1}{4}$–$\frac{1}{3}$ in. broad, straight or falcate. Veins not very distinct, anastomosing, forming large irregular areoles with included free veinlets. Sori rather small, distant, broadly oblong or rounded, forming a row parallel with the margin and just within it, sunk in a shallow cavity of the frond and thus forming a pustule on the upper surface.—*A. Cunn. Precur.* (1836) n. 175;

Raoul Choix (1846) 37 ; *Hook. Sp. Fil.* v (1864) 80 ; *Hook. f. Handb. N.Z. Fl.* (1864) 382 ; *Hook. and Bak. Syn. Fil.* (1873) 363 ; *Thoms. N.Z. Ferns* (1882) 89 ; *Field N.Z. Ferns* (1890) 141, t. 17, f. 2 ; *Cheesem. Man. N.Z. Fl.* (1906) 1013. P. scandens *Forst. f. Prodr.* (1786) n. 437 ; *Benth. Fl. Austral.* vii (1878) 770. Phymatodes pustulata *Presl Tent. Pterid.* (1836) 196 ; *Hook. f. Fl. Nov. Zel.* ii (1855) 42. Pleopeltis pustulata *Moore Ind. Fil.* (1857) 78.

North and South Islands, Chatham Islands : Abundant in woods from the North Cape to Nelson, Marlborough, and Westland, from thence less common to the south of Otago. Sea-level to 2500 ft.

Found also in eastern Australia, from Queensland to Victoria, and in Norfolk Island. The fronds are fragrant when freshly dried, and were formerly used by the Maoris for scenting oil for applying to the person. Mr. Carruthers (Fl. Vitiensis, 369) considers that this is Forster's *P. scandens*, and that his *P. pustulatum* is the same as *P. diversifolium*.

5. **P. diversifolium** *Willd. Sp. Plant.* v (1810) 166.—Rhizome long, stout, creeping, often glaucous, clothed with appressed ovate-lanceolate acuminate scales, which are dark-brown or almost black with usually a pale scarious margin. Stipes jointed on to the rhizome, 2–8 in. long, stout, firm, erect, smooth and glossy, quite naked. Fronds numerous, scattered along the rhizome, bright-green, coriaceous, quite glabrous, polymorphous ; sometimes 3–9 in. long, ½–2 in. broad, lanceolate or ovate-lanceolate, entire ; at other times 6–18 in. long, 3–9 in. broad, deeply pinnatifid. Segments varying in number from 1 to 12 on a side, 1–5 in. long, ⅓–1¼ in. broad, oblong-lanceolate or linear, usually acuminate, confluent at the base with the broadly winged rhachis. Veins conspicuous, the primary ones irregular, enclosing between them several areoles with free included veinlets. Sori numerous, large, orbicular, forming a single row on each side of the midrib, medial or rather nearer the margin than the midrib.—*P. Billardieri R. Br. Prodr.* (1810) 147 ; *A. Cunn. Precur.* (1836) n. 174 ; *Raoul Choix* (1846) 37 ; *Hook. Sp. Fil.* v (1864) 82 ; *Hook. and Bak. Syn. Fil.* (1873) 364 ; *Thoms. N.Z. Ferns* (1882) 90 ; *Field N.Z. Ferns* (1890) 141, t. 2, f. 4 ; *Cheesem. Man. N.Z. Fl.* (1906) 1013. P. Phymatodes *A. Rich. Fl. Nouv. Zel.* (1832) 66 (*not of Linn.*). P. scandens *Labill. Pl. Nov. Holl.* ii (1806) 91, t. 240 (*not of Forst. f.*). Phymatodes Billardieri *Presl Tent. Pterid.* (1836) 196 ; *Hook. f. Fl. Antarct.* i (1844) 111 ; *Fl. Nov. Zel.* ii (1855) 42.

Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands, Auckland and Campbell Islands : Abundant throughout, usually on trees or rocks, but sometimes on the ground. Sea-level to 3000 ft.

Found also in Norfolk Island, Lord Howe Island, New Caledonia, Australia, and Tasmania, and very closely allied to the tropical *P. Phymatodes* Linn.

6. **P. novae-zealandiae** *Bak. in Hook. Ic. Plant.* t. 1674.—Rhizome long, stout, woody, as thick as the finger, densely clothed with large tawny ovate-lanceolate scales. Stipes 6–12 in. long, firm, erect, pale-brown, shining, quite naked. Fronds scattered along the rhizome, large, 1–4 ft. long, 6–14 in. broad, oblong-lanceolate, acuminate, thinly coriaceous, dark-green, quite glabrous, deeply pinnatifid or almost pinnate at the base ; rhachis narrowly winged. Segments (or pinnae) 8–20 pairs, opposite or nearly so, ascending, 4–8 in. long, about ½ in. broad, linear-lanceolate, acuminate, quite entire or obscurely sinuate, the lower ones sometimes narrowed

towards the base. Veins indistinct, copiously anastomosing; areoles rather large with included free veinlets. Sori large, globose, forming a single row on each side of the midrib, rather nearer the margin than the midrib.—*Ann. Bot.* v (1891) 479; *Thoms. N.Z. Ferns* (1882) 90; *Field N.Z. Ferns* (1890) 142, t. 27, f. 3; *Cheesem. Ill. N.Z. Fl.* ii (1914) t. 247.

North Island: Te Aroha, Pirongia, and Karioi Mountains, *T. F. C.;* Lake Waikaremoana, *A. Hamilton!* Waimarino Forest, *R. Curtis! T. F. C.;* forest to the west of Ruapehu, *H. C. Field! T. F. C., Cockayne.* Usually on logs or climbing up trees, rarely on the ground. 1500–3000 ft.

Apparently confined to the forest country in the central portions of the North Island. Closely allied to *P. diversifolium*, but the rhizome is much stouter, and densely clothed with shaggy spreading scales; the fronds are larger, often 4 ft. long, and more deeply pinnatifid; the segments are more numerous, longer and narrower; the venation is not so distinct, and the texture thinner. There is also no tendency to the polymorphism of the fronds so noticeable in both *P. diversifolium* and *P. pustulatum*, and simple fronds are apparently unknown.

32. **CYCLOPHORUS** Desv.

Rhizome long and creeping, or short and tufted. Stipes jointed on to the rhizome, not continuous with it. Fronds in the majority of the species simple and entire, often dimorphous, usually covered with a densely felted tomentum composed of star-like hairs carried at the top of a jointed stalk. Veins often buried in the substance of the frond, when visible copiously anastomosing. Sori numerous, dorsal, globose or oblong, irregularly placed, often covering the whole of the under-surface of the upper part of the frond. Sporangia stalked, girt by an incomplete vertical ring, bursting transversely.

A genus of about 50 species, mostly tropical, and best developed in Indo-Malaya, Melanesia, and Polynesia. There is little to separate it from *Polypodium* except the felted tomentum of star-shaped hairs.

1. **C. serpens** *C. Christen. Ind. Fil.* (1905) 201. — Rhizome long, creeping, branched, climbing up the trunks of trees or over rocks, clothed with lanceolate long-acuminate ferruginous scales. Stipites remote, ½–3 in. long, firm, erect, jointed on the top of a scaly prolongation of the rhizome. Fronds dimorphous, simple, entire or obscurely sinuate, very thick and coriaceous, dark-green or yellow-green, glabrous or nearly so above, beneath densely clothed with whitish or buff-coloured stellate scales; sterile fronds variable in size and shape, 1–3 or even 4 in. long, ½–1 in. broad, obovate-spathulate or elliptical-spathulate to nearly orbicular, obtuse; fertile longer and narrower, 2–6 in. long, ½–¾ in. broad, linear-oblong or linear-lanceolate, obtuse or subacute, gradually tapering into the stipes. Veins quite hidden in the substance of the frond, copiously anastomosing. Sori very copious, irregularly scattered, large, prominent, often confined to the upper part of the frond, usually confluent in age.—Polypodum serpens *Forst. f. Prodr.* (1786) n. 435; *Hook. and Bak. Syn. Fil.* (1873) 349; *Benth. Fl. Austral.* vii (1878) 767; *Thoms. N.Z. Ferns* (1882) 89; *Field N.Z. Ferns* (1890) 140, t. 6, f. 9; *Cheesem. Man. N.Z. Fl.* (1906) 1012. P. rupestre *R. Br. Prodr.* (1810) 136; *Hook. f. Handb. N.Z. Fl.* (1864) 381; *Hook. Sp. Fil.* v (1864) 46. P. stellatum *A. Rich. Fl. Nouv. Zel.* (1832) 64. Niphobolus rupestris *Spreng. Syst. Veg.* iv (1827) 44; *Hook. and Grev. Ic.*

Fil. (1829) t. 93 ; *A. Cunn. Precur.* (1836) n. 178 ; *Raoul Choix* (1846) 37 ; *Hook. f. Fl. Nov. Zel.* ii (1855) 44. N. bicolor *Kaulf. Enum. Fil.* (1824) 128.

Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands : Abundant throughout. Sea-level to 3500 ft.

Plentiful in eastern Australia, also found in Norfolk Island and several of the Pacific islands.

33. **GLEICHENIA** Smith.

Rhizome long, creeping, rigid and wiry, often clothed with chaffy scales. Stipes tall, erect or scrambling, usually rather slender. Fronds once or several times dichotomously forked, usually with a terminal bud in the fork, the divisions often spreading in a horizontal plane, ultimate branches pinnately divided. Segments of the pinnae rather small and broadly ovate or suborbicular, or larger and oblong to linear-lanceolate. Veins free. Sori dorsal, placed on the fork or at the tip of an exterior veinlet, of 2–12 sporangia. Indusium wanting. Sporangia sessile, splitting vertically, completely surrounded by a broad transverse ring.

Species between 50 and 60, chiefly tropical, but one species extends as far north as Japan, and 5 are found in New Zealand. Of these, 1 is widely spread in hot countries, 3 extend to Australia and New Caledonia, the remaining 1 is endemic.

* Eugleichenia. *Segments of the pinnae small, suborbicular. Sori solitary at the apex of a veinlet.*

Segments of the pinnae flat or slightly recurved. Sporangia 2–4, near the upper inner angle .. .. 1. *G. circinata.*

Segments of the pinnae with their margins incurved almost to the rhachis, hence pouch-shaped. Sporangia usually 2 .. 2. *G. dicarpa.*

** Mertensia. *Segments of the pinnae linear or linear-oblong, much larger than in the previous section. Sori near the middle or at the fork of a veinlet.*

† No accessory pinnae at the base of the lower forks of the frond.

Fronds umbrella-shaped, rigid and coriaceous. Segments of the pinnae entire, glaucous beneath. Sporangia 2–5 .. .. 3. *G. Cunninghamii.*

Fronds fan-shaped, submembranous. Segments of the pinnae serrulate, green on both surfaces. Sporangia 3–5 .. .. 4. *G. flabellata.*

†† A pair of spreading or deflexed accessory pinnae at the base of the lower forks of the frond.

Fronds repeatedly dichotomous, the ultimate branches ending in a pair of pinnae 3–12 in. long. Pinnulēs lanceolate, obtuse, glaucous beneath. Sporangia 6–12 .. .. .. 5. *G. linearis.*

1. **G. circinata** *Swartz Syn. Fil.* (1806) 165.—Very variable in size and mode of growth, sometimes stiff, erect, 1–3 ft. high ; sometimes weak and scrambling among other vegetation and attaining a length of 3–5 ft. or more. Rhizome long, slender, wiry, often much branched, more or less clothed with reddish-brown fimbriate scales. Stipes smooth, slender, cylindrical, glabrous or more or less densely scaly and woolly. Fronds usually repeatedly dichotomous and proliferous from the lower axils ; branches zigzag, spreading, often interlaced ; rhachides generally clothed with rusty-red stellate hairs often mixed with fimbriate scales, rarely glabrous. Pinnae numerous along the branches, spreading, $\frac{1}{2}$–2 in. long, $\frac{1}{12}$–$\frac{1}{6}$ in. broad, narrow-linear, uniformly pinnatifid to the base. Segments

T.N.Z.I. Vol. 56, p. 83.

Gleichenia.

"1. G. circinata Sw. (1806), not authors. Syn. G. dicarpa R.Br. (1810).
2. G. microphylla R. Br. (1810). Syn. G. circinata of authors.

"Yours series should thus be named--

1. G. circinata with its var. hecistophylla.
2. G. microphylla (G. circinata of yours).

"May G. alpina be maintained as a distinct species?" (C.C.)

small, suborbicular, coriaceous, convex above, the margins so much recurved beneath that the segment is cucullate or pouch-shaped, usually clothed with woolly hairs beneath. Sori one to each segment, just visible in the pocket-like cavity of the segment, or concealed by woolly hairs; sporangia 1–2, rarely more.—*Hook. Sp. Fil.* i (1846) 3, t. 1c; *Hook. f. Fl. Nov. Zel.* ii (1855) 5; *Handb. N.Z. Fl.* (1864) 348; *Benth. Fl. Austral.* vii (1878) 698; *Hook. and Bak. Syn. Fil.* (1873) 12; *Thoms. N.Z. Ferns* (1882) 25; *Field N.Z. Ferns* (1890) 37, t. 3, f. 1; *Cheesem. Man. N.Z. Fl.* (1906) 1018.

Var. **hecistophylla.**—Usually 1–3 ft. high. Frond much and closely dichotomously branched, usually spreading in a horizontal plane; stipes and rhachis densely woolly and scaly. Segments strongly incurved beneath, sometimes as much as in the typical form, but variable in this respect.—G. hecistophylla *A. Cunn. Precur.* (1836) n. 163; *Hook. Sp. Fil.* i (1846) 4, t. 2B. G. semi-vestita *var.* hecistophylla *Hook. f. Fl. Nov. Zel.* ii (1855) 5. G. circinata *var.* hecistophylla *Hook. f. Handb. N.Z. Fl.* (1864) 348.

Var. **alpina** *Hook. f. Fl. Tasm.* ii (1860) 131.—Smaller and more compactly tufted, 2–12 in. high; rhachis, young shoots, and under-surface of segments densely clothed with ferruginous wool mixed with scales. Fronds much smaller and more sparingly divided.—*Handb. N.Z. Fl.* (1864) 348; *Benth. Fl. Austral.* vii (1878) 698. G. alpina *R. Br. Prodr.* (1810) 161; *Hook. and Grev. Ic. Fil.* (1829) t. 58; *Hook. Sp. Fil.* i (1846) 2.

North and South Islands, Stewart Island, Chatham Islands: Var. *hecistophylla* abundant in swampy places on poor soils in the North Island, local elsewhere. Sea-level to 2000 ft. Var. *alpina:* Mountainous localities from Moehau (Cape Colville) and Rotorua southwards, ascending to 4500 ft.

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Fronds fan-shaped, submembranous. Segments of the pinnae serrulate, green on both surfaces. Sporangia 3–5	..	..	4. *G. flabellata.*

†† A pair of spreading or deflexed accessory pinnae at the base of the lower forks of the frond.

Fronds repeatedly dichotomous, the ultimate branches ending in a pair of pinnae 3–12 in. long. Pinnules lanceolate, obtuse, glaucous beneath. Sporangia 6–12	..	..	5. *G. linearis.*

1. **G. circinata** *Swartz Syn. Fil.* (1806) 165.—Very variable in size and mode of growth, sometimes stiff, erect, 1–3 ft. high ; sometimes weak and scrambling among other vegetation and attaining a length of 3–5 ft. or more. Rhizome long, slender, wiry, often much branched, more or less clothed with reddish-brown fimbriate scales. Stipes smooth, slender, cylindrical, glabrous or more or less densely scaly and woolly. Fronds usually repeatedly dichotomous and proliferous from the lower axils ; branches zigzag, spreading, often interlaced ; rhachides generally clothed with rusty-red stellate hairs often mixed with fimbriate scales, rarely glabrous. Pinnae numerous along the branches, spreading, $\frac{1}{2}$–2 in. long, $\frac{1}{12}$–$\frac{1}{6}$ in. broad, narrow-linear, uniformly pinnatifid to the base. Segments

See. B. Mus. occas. papers. Vol. XVII : 79–84, 1942.

numerous, closely placed, broadly ovate or orbicular, obtuse, adnate by a broad base, flat or concave beneath, not cucullate nor pouch-shaped, coriaceous or almost membranous, green or glaucous beneath, glabrous or the costa more or less woolly and chaffy. Veins pinnately branched. Sori solitary in the segments, placed at the tip of the exterior veinlet near the upper angle of the segment, of 2–4 sporangia.—*Hook. and Bak. Syn. Fil.* (1873) 11 ; *Hook. f. Handb. N.Z. Fl.* (1864) 347 (*excl. var.* hecistophylla) ; *Benth. Fl. Austral.* vii (1878) 697 ; *Thoms. N.Z. Ferns* (1882) 25 ; *Field N.Z. Ferns* (1890) 36, t. 2, f. 2 ; *Cheesem. Man. N.Z. Fl.* (1906) 1017. G. semi-vestita *Labill. Sert. Nov. Cal.* (1824) 8, t. 11 ; *Hook. Sp. Fil.* i (1846) 3, t. 2A ; *Hook. f. Fl. Nov. Zel.* ii (1855) 5 (*excl. var.* hecistophylla). G. microphylla *R. Br. Prodr.* (1910) 161. G. speluncae *R. Br. Prodr.* (1810) 160. G. punctulata *Col. in Trans. N.Z. Inst.* xvi (1884) 344. G. patens *Col. in Trans. N.Z. Inst.* xx (1888) 212.

North and South Islands, Stewart Island : From the North Cape southwards, plentiful in the North Island, but rare and local to the south of Cook Strait. Sea-level to 2000 ft. *Waewaekaka ; Waewaematuku.*

Common in Australia, also extending to New Caledonia and Malaya. Mr. Colenso's *G. patens* is an excessively proliferous state with slender almost subscandent stems, forming large masses in heated soil near hot springs at Taupo. The fronds are more membranous than usual, but that and its other peculiarities are easily accounted for by the exceptional nature of its habitat.

2. **G. dicarpa** *R. Br. Prodr.* (1810) 161.—Very similar to *G. circinata* in habit and mode of growth, but smaller, 1–2½ ft. high. Rhizome slender, wiry, usually clothed with chaffy scales. Stipes smooth, slender, glabrous or scaly-hispid. Fronds several times dichotomous, usually proliferous ; branches spreading in a horizontal plane, often interlaced ; rhachides scaly and hairy or sometimes almost glabrous. Pinnae numerous along the branches, spreading, ½–1¼ in. long, $\frac{1}{25}$–$\frac{1}{10}$ in. broad, very narrow-linear, deeply and uniformly pinnatifid. Segments numerous, closely placed, small, suborbicular, coriaceous, convex above, the margins so much recurved beneath that the segment is cucullate or pouch-shaped, usually clothed with woolly hairs beneath. Sori one to each segment, just visible in the pocket-like cavity of the segment, or concealed by woolly hairs ; sporangia 1–2, rarely more.—*Hook. Sp. Fil.* i (1846) 3, t. 1C ; *Hook. f. Fl. Nov. Zel.* ii (1855) 5 ; *Handb. N.Z. Fl.* (1864) 348 ; *Benth. Fl. Austral.* vii (1878) 698 ; *Hook. and Bak. Syn. Fil.* (1873) 12 ; *Thoms. N.Z. Ferns* (1882) 25 ; *Field N.Z. Ferns* (1890) 37, t. 3, f. 1 ; *Cheesem. Man. N.Z. Fl.* (1906) 1018.

(A. Cunn.) Hook. f.

Var. **hecistophylla.** — Usually 1–3 ft. high. Frond much and closely dichotomously branched, usually spreading in a horizontal plane ; stipes and rhachis densely woolly and scaly. Segments strongly incurved beneath, sometimes as much as in the typical form, but variable in this respect.—G. hecistophylla *A. Cunn. Precur.* (1836) n. 163 ; *Hook. Sp. Fil.* i (1846) 4, t. 2B. G. semi-vestita *var.* hecistophylla *Hook. f. Fl. Nov. Zel.* ii (1855) 5. G. circinata *var.* hecistophylla *Hook. f. Handb. N.Z. Fl.* (1864) 348.

(A. Cunn.)

Var. **alpina** *Hook. f. Fl. Tasm.* ii (1860) 131.—Smaller and more compactly tufted, 2–12 in. high ; rhachis, young shoots, and under-surface of segments densely clothed with ferruginous wool mixed with scales. Fronds much smaller and more sparingly divided.—*Handb. N.Z. Fl.* (1864) 348 ; *Benth. Fl. Austral.* vii (1878) 698. G. alpina *R. Br. Prodr.* (1810) 161 ; *Hook. and Grev. Ic. Fil.* (1829) t. 58 ; *Hook. Sp. Fil.* i (1846) 2.

North and South Islands, Stewart Island, Chatham Islands : Var. *hecistophylla* abundant in swampy places on poor soils in the North Island, local elsewhere. Sea-level to 2000 ft. Var. *alpina :* Mountainous localities from Moehau (Cape Colville) and Rotorua southwards, ascending to 4500 ft.

As a species, *G. dicarpa* stands very near to *G. circinata*, principally differing in the smaller segments of the pinnae, which have their margins incurved almost to the costa, leaving only a narrow slit open, through which the sori are visible unless masked by the ferruginous tomentum. I have followed the "Synopsis Filicum" in placing Cunningham's *G. hecistophylla* under *G. dicarpa*, but it has equal claims to be included with *G. circinata*, which was the position given to it by Sir J. D. Hooker, both in the Flora and the Handbook. The late Baron Mueller justly observed (Veg. Chath. Isl. 63) that it obliterates the limits of the two species. The typical form of *G. dicarpa* occurs in eastern Australia, New Caledonia, and Malaya, and var. *alpina* in Tasmania.

3. **G. Cunninghamii** *Heward ex Hook. Sp. Fil.* i (1846) 6, t. 6B.—Usually from 1–3 ft. high, but taller plants are sometimes seen. Rhizome long, branched, creeping, stout and woody, clothed with red-brown lanceolate scales. Stipes stout, erect, grooved down one side, in the young state densely clothed with large deciduous scales, becoming almost glabrous when old. Fronds several times dichotomously branched, the branches usually spreading all round in a horizontal plane and forming an umbrella-like top to the stipes, in large specimens proliferous from the centre, so that frequently there are 2–4 superposed tiers of branches. Ultimate branches or pinnae 3–12 in. long, $\frac{1}{2}$–$1\frac{1}{4}$ in. broad, linear-lanceolate, acuminate, deeply pectinate-pinnatifid above, pinnate below; rhachis usually clothed with deciduous scales and pilose. Segments $\frac{1}{3}$–$\frac{2}{3}$ in. long, $\frac{1}{8}$–$\frac{1}{4}$ in. broad, linear, straight or often falcate, acute, quite entire, coriaceous, dark-green and glabrous above, glaucous and usually pilose beneath; margins flat or recurved. Transverse veins numerous, forked near the base. Sori copious, solitary on one of the veinlets, of 2–5 sporangia.—*Hook. f. Fl. Nov. Zel.* ii (1855) 6, t. 71; *Handb. N.Z. Fl.* (1864) 348; *Hook. and Bak. Syn. Fil.* (1873) 13; *Thoms. N.Z. Ferns* (1882) 26; *Field N.Z. Ferns* (1890) 39, t. 7, f. 3; *Cheesem. Man. N.Z. Fl.* (1906) 1019. G. ciliata *Col. in Trans. N.Z. Inst.* xxix (1897) 414.

North and South Islands, Stewart Island: In forests from the North Cape southwards, abundant in the North Island, local to the south of Cook Strait. Sea-level to 4000 ft. *Umbrella Fern; Tapuwaekotuku.*

Allied to *G. flabellata*, but the fronds spread in a horizontal plane, and are much more rigid and coriaceous, and the segments are shorter and narrower, quite entire, and glaucous beneath. It appears to be confined to New Zealand.

4. **G. flabellata** *R. Br. Prodr.* (1810) 161.—From 1–4 ft. high. Rhizome long, stout, branched, more or less clothed with reddish-brown laciniate scales. Stipes erect, cylindrical below, subcompressed above, slightly scaly or almost glabrous. Fronds several times dichotomously branched, ascending and fan-shaped, not spreading in a horizontal plane, often proliferous from the lower forks, so that there are sometimes 2–3 tiers of superposed branches. Ultimate branches or pinnae 4–12 in. long, 1–2 in. broad, lanceolate, acuminate or caudate, deeply pectinate-pinnatifid or pinnate towards the base. Segments close-set, ascending, $\frac{1}{2}$–1 in. long, narrow-linear, subacute, serrulate towards the tip, dilated at the base, green on both surfaces, glabrous above, often more or less scaly-pubescent beneath. Transverse veins numerous, forked near the base. Sori copious, solitary on one of the veinlets, of 3–5 sporangia.—*A. Cunn. Precur.* (1836) n. 164; *Raoul Choix* (1846) 37; *Hook. Sp. Fil.* i (1846) 6; *Fil. Exot.* (1857–59) t. 71; *Hook. f. Fl. Nov. Zel.* ii (1855) 6; *Handb. N.Z. Fl.* (1864) 348; *Hook. and Bak. Syn. Fil.* (1873) 12; *Benth. Fl. Austral.* vii (1878) 698; *Thoms. N.Z. Ferns* (1882) 26; *Field N.Z. Ferns* (1890) 41, t. 8, f. 1; *Cheesem. Man. N.Z. Fl.* (1906) 1020. G. littoralis *Col. in Trans. N.Z. Inst.* xvi (1884) 344.

North Island: Auckland—Not uncommon by the side of streams, &c., from the North Cape to the Bay of Islands and Great Barrier Island, rare and local southwards to the Kauaeranga River (Thames) and the Manukau Harbour.

Also in Australia, ranging from Queensland to Tasmania, and in New Caledonia. Mr. Colenso's *G. littoralis* is certainly nothing more than a dwarf state, usually occurring near the sea.

5. **G. linearis** *C. B. Clarke in Trans. Linn. Soc.* i, 2d. series (1880) 428.—Usually from 2–4 ft. high, but sometimes dwarfed to a few inches, and occasionally reaching 6 ft. Rhizome long, slender, clothed with narrow reddish-brown bristly scales. Stipes slender, smooth and polished. Fronds repeatedly dichotomous or trichotomous, the ultimate branches ending in a pair of pinnae 3–12 in. long; a pair of smaller spreading or deflexed pinnae is also placed at the base of the lower forks. Pinnae lanceolate, acuminate, pinnatifid almost to the base. Segments close, spreading, ½–1 in. long, linear, entire, obtuse or emarginate, glaucous beneath and sometimes pubescent on the costa, firm or more or less membranous, pale-green. Veins transversely spreading from the costa, each one pinnately divided from near the base into 3–6 veinlets. Sori solitary on an exterior veinlet, of 6–12 sporangia.—*Hook. Sp. Fil.* i (1846) 12; *Hook. and Bak. Syn. Fil.* (1873) 15; *Hook. f. Handb. N.Z. Fl.* (1864) 747; *Benth. Fl. Austral.* vii (1878) 698; *Thoms. N.Z. Ferns* (1882) 27; *Field N.Z. Ferns* (1890) 39, t. 4, f. 1; *Cheesem. Man. N.Z. Fl.* (1906) 1020. G. Hermanni *R. Br. Prodr.* (1810) 161. Mertensia dichotoma *Willd. in Vet. Akad. Handb.* (1804) 167. Polypodium dichotomum *Thunb. Fl. Jap.* (1784) 338, t. 37. Polypodium lineare *Burm. Fl. Ind.* (1768) 235, t. 67.

North Island: Auckland—In heated soil near hot springs; Rotomahana, *Captain G. Mair! T. Kirk!* (in this locality destroyed by the eruption of Tarawera in 1886); Otumakokori and Orakeikorako, *T. Kirk! T. F. C.;* Karapiti, *Hochstetter;* Wairakei, *Norton! Field, T. F. C.;* hot springs near Matata, *Captain G. Mair.* Sea-level to 1600 ft.

Almost universal in tropical and subtropical countries. Forster, in his "Esculent Plants" (p. 75), recorded it as a native of New Zealand, and stated that the roots were eaten by the Natives; but as he only collected in the South Island it is extremely improbable that he ever saw it in New Zealand, and there is no other record of the roots being eaten.

34. **SCHIZAEA** Smith.

Rhizome short, thick, creeping. Stipes rigid, wiry, erect. Fronds simple or forked or dichotomously branched, flat or terete, very narrow, without expanded laminae. Sori on the under-surface of fertile segments terminating the frond or its branches, each segment consisting of a number of crowded linear pinnae, those of the opposite sides being usually applied to one another so as to conceal the under-surface. Sporangia ovoid, sessile, splitting vertically, crowned by a complete transverse ring, arranged in 2 or rarely 4 rows on the under-surface of the pinnae of the fertile segments.

A small genus of about 25 species, dispersed through the tropical or warm temperate regions of both hemispheres. Two of the New Zealand species are widely distributed; the third extends to Australia alone.

Fronds smooth, terete or nearly so, undivided .. .. .. 1. *S. fistulosa.*

Fronds scabrous, terete or obscurely compressed, forked or rarely twice or three times forked .. .. 2. *S. bifida.*

Fronds smooth, compressed, repeatedly dichotomously forked, flabellate .. .. 3. *S. dichotoma.*

1. **S. fistulosa** *Labill. Pl. Nov. Holl.* ii (1806) 103, t. 250.—Rhizome short, thick, creeping, clothed with dark chestnut-brown linear scales. Fronds numerous towards the end of the rhizome, not distinct from the stipes, dark-brown below, greenish-brown above, 4–12 in. long, $\frac{1}{40}$ in. broad, filiform, erect or flexuous, rigid, wiry, terete, grooved down the face, unbranched. Fertile segment terminating the frond, $\frac{1}{2}$–1 in. long, erect or suberect, consisting of 10–20 closely placed pinnae on each side; pinnae all pointing in one direction, $\frac{1}{8}$–$\frac{1}{4}$ in. long, linear, incurved at the tip; margins denticulate or fringed. Sporangia in 2 closely placed rows, covering the whole of the under-surface.—*Hook. f. Handb. N.Z. Fl.* (1864) 749; *Hook. and Bak. Syn. Fil.* (1873) 429; *Benth. Fl. Austral* vii (1878) 693; *Thoms. N.Z. Ferns* (1882) 95; *Field N.Z. Ferns* (1890) 150, t. 14, f. 5; *Cheesem. Man. N.Z. Fl.* (1906) 1021. S. propinqua *A. Cunn. Precur.* (1836) n. 168.

Var. **australis** *Hook. f. Handb. N.Z. Fl.* (1864) 749.—Smaller, 1–3 in. high; rhizome stouter in proportion. Fertile segment $\frac{1}{4}$–$\frac{1}{3}$ in. long, of 6–8 pairs of pinnae. S. australis *Gaud. Fl. Ins. Mal.* (1825) 98; *Hook. f. Fl. Antarct.* i (1844) 111; *Hook. and Bak. Syn. Fil.* (1873) 428; *Thoms. N.Z. Ferns* (1882) 95. S. palmata *Homb. et Jacq. Voy. au Pôle Sud.* ii (1853) *Crypt.* 82, t. z.

North and South Islands, Chatham Islands, Auckland Islands: The typical form not uncommon in barren clay soils throughout the North Island, apparently rare and local to the south of Cook Strait. Var. *australis*: Cold peaty localities in mountain districts from Moehau (Cape Colville) southwards, descending to sea-level in Stewart Island and the Auckland Islands. Sea-level to 4000 ft.

Also in Australia and Tasmania, New Caledonia, Madagascar, Chile, and the Falkland Islands. *S. australis* is clearly only a depauperated form, connected with the type by transitional stages.

2. **S. bifida** *Willd. in Akad. Wiss. Erf.* i (1802) 30, t. 3.—Rhizome very short, stout, creeping. Fronds close together along the rhizome, not distinct from the stipes, 6–12 in. high or more, about $\frac{1}{30}$ in. diam., rigid, erect, wiry, more or less scabrous, somewhat flattened, with a prominent midrib and narrow thick wing on each side, usually forked at or below the middle, rarely undivided, the branches sometimes forked a second or even a third time. Fertile segments terminating the branches, $\frac{1}{2}$–$\frac{3}{4}$ in. long, erect or slightly recurved, rather broader than in *S. fistulosa*, of 10–20 closely placed pinnae on each side. Pinnae all turned to the one side, $\frac{1}{6}$–$\frac{1}{3}$ in. long, linear, fringed with long cilia. Sporangia in 2 closely placed rows, rather smaller than in *S. fistulosa*.—*A. Rich. Fl. Nouv. Zel.* (1842) 95; *A. Cunn. Precur.* (1836) n. 169; *Raoul Choix* (1846) 37; *Hook. f. Fl. Nov. Zel.* ii (1855) 47; *Handb. N.Z. Fl.* (1864) 385 (*in part*); *Hook. and Bak. Syn. Fil.* (1873) 429; *Benth. Fl. Austral.* vii (1878) 693; *Thoms. N.Z. Ferns* (1882) 96; *Field N.Z. Ferns* (1890) 151, t. 12, f. 3; *Cheesem. Man. N.Z. Fl.* (1906) 1022.

North Island: On sterile clay or pumiceous soils from the North Cape to Cook Strait, but often local. South Island: Nelson—Takaka and Paramahoi, *Kingsley.* Sea-level to 2000 ft.

Also in Australia and Tasmania. Unbranched specimens are best distinguished from *S. fistulosa* by the scabrous frond and broader fertile segment.

3. **S. dichotoma** *Smith in Mem. Act. Turin.* v (1793) 422, t. 9.—Rhizome short, stout, creeping. Fronds few or many, close together, 6–14 in. long, erect, rigid, wiry; lower portion or stipes angular, channelled in front; upper portion repeatedly dichotomous, forming a flabellate or

deltoid frond 2–4 in. across or more; branches flattened, $\frac{1}{20}$–$\frac{1}{12}$ in. broad; midrib stout, evident; margins sometimes minutely toothed towards the tip. Fertile segments terminating the branches, distinctly stalked, erect or inclined, $\frac{1}{4}$–$\frac{1}{3}$ in. long, consisting of 4–10 spreading pinnae on each side; pinnae $\frac{1}{8}$–$\frac{1}{4}$ in. long, linear, fringed with long hairs. Sporangia in two closely placed rows.—*Hook. and Grev. Ic. Fil.* (1829) t. 17; *A. Cunn. Precur.* (1836) n. 170; *Raoul Choix* (1846) 37; *Hook. f. Fl. Nov. Zel.* ii (1855) 47; *Handb. N.Z. Fl.* (1864) 385; *Hook. and Bak. Syn. Fil.* (1873) 430; *Benth. Fl. Austral.* vii (1878) 694; *Thoms. N.Z. Ferns* (1882) 96; *Field N.Z. Ferns* (1890) 151, t. 24, f. 2; *Cheesem. Man. N.Z. Fl.* (1906) 1022.

North Island: Auckland—In kauri forests from Kaitaia and Mangonui southwards to Tairua and the Lower Waikato, not common; in heated soil near hot springs at Orakeikorako, Upper Waikato, *T. Kirk, C. J. Norton!* Sea-level to 1500 ft.

A widely spread species, found in the tropical and warm temperate regions of both hemispheres, with the exception of the Continent of Africa. It has been recorded from Madagascar and the Mascarene Islands.

35. **LYGODIUM** Swartz.

Climbing ferns, with long twining stems, often ascending trees to a considerable height. Primary pinnae distant on the common rhachis or stem, and inserted on it by a short and often almost obsolete petiole, dichotomously divided; the secondary divisions divaricate, stalked, usually again dichotomous, or in species not found in New Zealand pinnately divided. Sterile pinnules ovate to oblong-lanceolate, ligulate; fertile usually much contracted and frequently copiously divided. Sporangia ovoid, obliquely sessile, splitting vertically, crowned by a complete transverse ring, arranged in two rows on the under-surface of the contracted fertile pinnules, or forming short spikes projecting from the margins of the leafy pinnules, each sporangium in the axil of a large scalelike indusium.

A very distinct genus of about 20 species, widely distributed in the tropics of both hemispheres. The single New Zealand species is endemic.

1. **L. articulatum** *A. Rich. Fl. Nouv. Zel.* (1832) 96, t. 15.—Rhizome slender, creeping, clothed with glossy chestnut-brown linear scales. Stipites very numerous, long, slender, climbing, reaching the tops of tall forest-trees, branched, wiry, often intertwined and forming almost impenetrable screens, quite smooth and glabrous. Primary pinnae dichotomously palmate-partite; primary petiole short, $\frac{1}{6}$–$\frac{1}{2}$ in. long; two secondary petioles widely diverging, 1 in. or more long, again twice forked; pinnules 2–4 in. long, $\frac{1}{3}$–$\frac{1}{2}$ in. broad, jointed at the base, ligulate-oblong or oblong-lanceolate, obtuse or subacute, thinly coriaceous, often glaucous beneath. Veins free. Fertile pinnae many times dichotomous, the ultimate pinnules small, much contracted, cuneate or flabellate, deeply lobed; the lobes ending in closely placed short spikelets, each with 8–12 sporangia on the under-surface.—*A. Cunn. Precur.* (1836) n. 167; *Raoul Choix* (1846) 37; *Hook. f. Fl. Nov. Zel.* ii (1855) 47; *Handb. N.Z. Fl.* (1864) 385; *Hook. and Bak. Syn. Fil.* (1873) 437; *Thoms. N.Z. Ferns* (1882) 96; *Field N.Z. Ferns* (1890) 152, t. 22, f. 4; *Cheesem. Man. N.Z. Fl.* (1906) 1023; *Ill. N.Z. Fl.* (1914) t. 248. L. gracilescens *Col. in Trans. N.Z. Inst.* xxviii (1896) 620.

North Island: Auckland—In woods from the North Cape to the Bay of Plenty and Kawhia, abundant. Sea-level to 2500 ft. *Mange-mange.*

The tough and wiry twining stems were formerly twisted into ropes by the Maoris and used for securing the thatch on the roofs of their houses; and they were also employed for making eel-traps.

36. **TODEA** Willd.

Rhizome thick, stout, erect, often forming a caudex of enormous size. Fronds numerous at the top of the rhizome, erect, 2–6 ft. high, thick and coriaceous, quite opaque, 2-pinnate. Ultimate divisions firm, entire or serrate. Veins simple or forked. Sori on the under-surface of the frond, usually of many sporangia, placed on the lateral veinlets proceeding from the costa, often confluent. Sporangia almost round, splitting to the base into two valves, ring rudimentary.

A genus of a single species confined to South Africa, Australia, Tasmania, and the northern portion of New Zealand.

1. **T. barbara** *Moore Ind. Fil.* (1857) 119.—Rhizome stout, erect, sometimes forming a trunk as much as 4 ft. high and 2 ft. diam. Stipes 1–2 ft. long or more, stout, erect, quite smooth. Fronds 2–4 ft. long, 9–12 in. broad, oblong-lanceolate, acute, dark-green, coriaceous, opaque, quite glabrous, 2-pinnate. Primary pinnae numerous, close, erecto-patent, 4–10 in. long or more, ½–2 in. broad, lanceolate. Pinnules 1–1½ in. long, ⅙–¼ in. broad, linear or linear-lanceolate, acute, serrate, the uppermost confluent. Sori towards the base of the frond, usually occupying nearly the whole of the under-surface of the lower pinnules of the lower pimnae, the remainder of the frond sterile.—*Hook. and Bak. Syn. Fil.* (1873) 427; *Bot. Mag.* t. 5954; *Benth. Fl. Austral.* vii (1878) 699; *Thoms. N.Z. Ferns* (1882) 93; *Field N.Z. Ferns* (1890) 148, t. 26, f. 1; *Cheesem. Man. N.Z. Fl.* (1906) 1024. T. africana *Willd. in Schrift. Akad. Erf.* (1802) 14, t. 3, f. 1; *Hook. f. Fl. Nov. Zel.* ii (1855) 48 *and* 338; *Fl. Tasm.* ii (1860) 153, t. 178; *Handb. N.Z. Fl.* (1864) 384. Osmunda barbara *Thunb. Fl. Cap.* (1800) 171. Aerostichum barbarum *Linn. Sp. Plant.* ii (1753) 1072.

North Island: Auckland—Abundant in open gullies from the North Cape to Mangonui, and from thence more sparingly southwards to Whangaroa.

Also in Australia, from Queensland to Tasmania, and in South Africa. In Australia the rhizome is often enlarged into a short and massive trunk sometimes weighing as much as a ton and a half, but I have seen no New Zealand specimens as large.

37. **LEPTOPTERIS** Presl.

Rhizome stout, erect, sometimes forming a caudex of considerable size. Fronds tufted at the top of the rhizome, numerous, erect, 2–5 ft. high, always membranous and pellucid, dark-green, 2–3-pinnate; ultimate divisions small, cut into numerous linear lobes. Veins simple or forked, not anastomosing. Sori on the under-surface of the frond, usually of many sporangia, placed on the lateral veinlets proceeding from the costa. Sporangia short-stalked, splitting vertically; ring rudimentary, transverse.

A genus of 7 species, all very closely allied, ranging from New Zealand and Australia northwards to Fiji, New Caledonia, and New Guinea. It only differs from *Todea* in the delicately membranous texture of the frond, and in being much more finely divided. Both the New Zealand species are endemic.

Fronds 1–2 ft. long, truncate at the base, the lower pinnae not reduced in size .. .. 1. *L. hymenophylloides.*

Fronds 1½–4 ft. long, narrowed at the base, the lower pinnae gradually reduced in size .. .. 2. *L. superba.*

1. **L. hymenophylloides** *Presl Suppl. Tent. Pterid.* (1845) 71.—Rhizome stout, erect, often produced into a short thick caudex. Stipes 6–12 in. long, slender, wiry, erect, brownish-green, smooth and glabrous or more or less clothed with floccose tomentum. Fronds forming a crown at the top of the rhizome, 1–2½ ft. long, 6–12 in. broad, ovate-deltoid to lanceolate-deltoid, acuminate, truncate at the base, very thin and membranous, pellucid, dark-green, 3-pinnatifid; rhachis and costae more or less clothed with reddish-brown floccose hairs or nearly glabrous. Primary pinnae rather close, 3–6 in. long, ¾–1½ in. broad, lanceolate or oblong-lanceolate, acuminate, the lower ones not gradually reduced in size and becoming very small. Pinnules close-set, ½–¾ in. long, about ¼ in. broad, linear-oblong, deeply pinnatifid. Segments linear, erecto-patent, acute, entire or forked or sometimes trifid. Sporangia on the midrib of the segments, usually confined to the lower half.—*Hook. f. Fl. Nov. Zel.* ii (1855) 48; *Handb. N.Z. Fl.* (1864) 384. Todea hymenophylloides *A. Rich. Fl. Nouv. Zel.* (1832) 97, t. 16; *Hook. Gen. Fil.* (1842) t. 46B; *Garden Ferns* (1862) t. 54; *Hook. and Bak. Syn. Fil.* (1873) 427; *Thoms. N.Z. Ferns* (1882) 93; *Field N.Z. Ferns* (1890) 148, t. 4, f. 3; *Cheesem. Man. N.Z. Fl.* (1906) 1025. T. pellucida *Hook. and Grev. in Bot. Misc.* iii (1833) 232. T. marginata *Col. in Trans. N.Z. Inst.* xxix (1897) 419.

North and South Islands, Stewart Island: From the North Cape southwards, not uncommon in forest districts. Sea-level to 3000 ft.

Confined to New Zealand. A state with the pinnae rather more closely placed, and with the lower ones more or less reduced in size, approaches *T. superba*, and is often distinguished as var. *intermedia* by fern-collectors.

2. **L. superba** *Presl in Abh. Bohm.* v (1848) 326.—Rhizome stout, forming a thick erect caudex 1–3 ft. high, coated with densely matted fibrous rootlets. Stipes 1–4 in. long, stout, erect, more or less densely tomentose. Fronds forming a handsome spreading crown at the top of the rhizome, 1½–4 ft. long, 6–10 in. broad, lanceolate, acuminate, very gradually narrowed to the base, dark-green, thin and membranous, pellucid, 3-pinnatifid; rhachis stout, densely woolly-tomentose, as are the secondary rhachises. Primary pinnae very numerous, close-set, the longest ones about the middle of the frond, 3–6 in. long, ½–¾ in. broad, linear or linear-lanceolate, acuminate; the lower ones gradually diminishing in size, the lowermost minute. Pinnules very close, much overlapping, ¼–½ in. long, linear-oblong, pinnatifid almost to the base. Segments narrow-linear, simple or forked. Sporangia much as in *T. hymenophylloides.*—*Hook. Ic. Plant.* (1854) t. 910; *Hook. f. Fl. Nov. Zel.* ii (1855) 48; *Handb. N.Z. Fl.* (1864) 384. Todea superba *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 138; *Hook. and Bak. Syn. Fil.* (1873) 428; *Thoms. N.Z. Ferns* (1882) 94; *Field N.Z. Ferns* (1890) 149, t. 21, f. 4; *Cheesem. Man. N.Z. Fl.* (1906) 1025, *and Ill. N.Z. Fl.* (1914) t. 249.

North and South Islands, Stewart Island: In dense moist forests from Te Aroha and Pirongia southwards, not uncommon, except in Marlborough, Canterbury, and the north of Otago, where it is rare and local. *Crape-fern; Prince of Wales's Feather.* Sea-level to 3500 ft.

Probably the most beautiful fern in New Zealand. It is closely allied to the preceding, and is connected with it by intermediate forms. Usually, however, it is readily distinguished by the larger and narrower frond, which tapers very gradually to the base, and by the closer and denser pinnules, which overlap considerably, the segments often turning up towards the upper side of the frond.

38. **MARATTIA** Smith.

Rhizome large, thick and swollen. Fronds numerous, large, 2–3-pinnate ; stipes stout, articulated at the base, and furnished with two adnate auricles. Veins all free. Sori oblong, placed at or near the tip of the veins, close to the margin of the pinnules, each sorus consisting of two parallel rows containing 4–12 sporangia, the sporangia of each row completely united into a boat-shaped mass called a synangium. Synangia coriaceous, the outer face smooth and convex, the inner flat and pierced by the narrow transverse slits of the dehiscent sporangia. Spores globose-tetrahedral.

A small genus of about 20 species, widely scattered through the tropical regions of both hemispheres and the warmer part of the South Temperate Zone. The single New Zealand species is found in Australia and Polynesia, South Africa, Malaya, Philippines, and India.

1. **M. fraxinea** *Smith Ic. Ined.* (1790) t. 48.—Rhizome a large irregularly shaped tuberous mass. Stipes stout, 1–2 ft. long or more, brownish-green, jointed at the base and furnished with large clasping auricles which are persistent on the rhizome. Fronds large, in fully grown specimens 6–12 ft. long, 2–5 ft. broad, ovate-deltoid, dark-green and glossy, coriaceous, 2-pinnate or rarely 3-pinnate. Primary pinnae 9 in. to 3 ft. long, often more than 1 ft. broad ; pinnules shortly stalked, 3–6 in. long, $\frac{1}{2}$–1 in. broad, lanceolate or oblong-lanceolate, acuminate, obliquely cuneate or rounded at the base ; margins minutely serrulate ; costa slightly scaly. Veins rather close, parallel, simple or sparingly forked. Sori oblong, brownish, $\frac{1}{10}$–$\frac{1}{8}$ in. long, on the veins just within the margin of the pinnules ; sporangia 8–12 to each synangium.—*Hook. and Bak. Syn. Fil.* (1873) 440 ; *Benth. Fl. Austral.* vii (1878) 695 ; *Thoms. N.Z. Ferns* (1882) 97 ; *Field N.Z. Ferns* (1890) 153, t. 25, f. 5 ; *Cheesem. Man. N.Z. Fl.* (1906) 1026. M. salicina *Smith in Rees Cyclop.* xxii (1802–20) 89 ; *Hook. f. Fl. Nov. Zel.* ii (1855) 49 ; *Handb. N.Z. Fl.* (1864) 386.

North Island : Lowland forests from Mangonui southwards to Cape Egmont and Waitotara, not common, usually in rich damp soils. *Para ; Parareka.* Sea-level to 1000 ft.

The large starchy rhizome was formerly eaten by the Maoris, and hence the plant was occasionally cultivated near their villages. It is now fast becoming rare.

39. **OPHIOGLOSSUM** Linn.

Rhizome usually short and suberect, sometimes slightly tuberous or nodose ; roots thick and fleshy, simple, sometimes giving rise to adventitious buds. Fronds solitary or 2–3 at the top of the rhizome, not circinate, stipitate, fleshy, composed of two portions ; one a leafy more or less expanded sterile lamina, with reticulated venation ; the other a narrow and much-contracted spike-like fertile part, which is inserted on the petiole or lamina of the sterile portion by a peduncle of variable length. Sporangia closely packed in 2 rows on the fertile spike and partly embedded in its tissue, globose, not annulate, dehiscing by a transverse slit ; spores numerous, tetrahedral.

A small genus, widely spread in both temperate and tropical regions. There is much uncertainty as to the limits of the species, which are estimated by some authors at 8–10 and by others (C. Christensen, for instance) at as many as 40. In the present work I have largely followed Prantl's latest arrangement, as far as the want of material allows me to do so.

1. **O. coriaceum** *A. Cunn. Precur.* (1836) n. 161.—Rhizome cylindric, suberect, slightly tuberous, roots fleshy. Fronds 1–2 (or rarely 3) from the rhizome, 1–3 in. long including the petiole and fertile spike; sterile lamina usually placed below the middle, $\frac{1}{4}$–2 in. long, $\frac{1}{6}$–$\frac{1}{3}$ in. broad, lanceolate to ovate-lanceolate, acute or obtuse or shortly apiculate, narrowed into a long cuneate base, fleshy or almost coriaceous; veins indistinct, reticulated in narrow areoles. Fertile spike $\frac{1}{4}$–$\frac{3}{4}$ in. long, on a slender peduncle which usually much exceeds the sterile lamina when mature. Sporangia 7–15 in each row.—*Presl Suppl.* (1845) 49; *Prantl Beit. Syst. Ophiog.* (1884) 314, t. 7, f. 9, 10, 11. O. gramineum *R. Br. Prodr.* (1810) 163 (*but not of Willd.*). O. lusitanicum *Hook. and Bak. Syn. Fil.* (1874) 445; *Thoms. N.Z. Ferns* (1882) 98; *Field N.Z. Ferns* (1890) 155, t. 21, f. 7 (*but not of Linn.*). O. vulgatum *vars.* gramineum, lusitanicum, *and* minimum *Hook. f. Fl. Nov. Zel.* i (1855) ii, 50; *Handb. N.Z. Fl.* (1864) 386. O. minimum *Col. ex Hook. and Bak.* (1874) 445. O. minimum *Armstr. in Trans. N.Z. Inst.* xiii (1881) 342.

Kermadec Islands, North and South Islands: Not uncommon in grassy places throughout, ascending to 3500 ft.

This, so far as New Zealand is concerned, consists of the varieties *gramineum*, *lusitanicum*, and *minimum* of the Flora and the Handbook. The two first are now considered to form a distinct species under Cunningham's name of *O. coriaceum*, of which Armstrong's *O. minimum* is probably a depauperated state. *O. coriaceum* is also known from Australia, Tasmania, Easter Island (Skottsberg), and Bolivia.

2. **O. pedunculosum** *Desv. in Berl. Mag.* v (1811) 306.—Rhizome short,

Ophioglossum Linn.

1. Rhizome slender, slightly tuberous, Blade slender; 1-2" long, $\frac{1}{8}$-$\frac{1}{2}$" wide. Spike $\frac{1}{4}$-$\frac{3}{4}$" long, no more. O. coriaceum.

2. Rhizome stouter. Blade often wide 1-$2\frac{1}{2}$" long, $\frac{1}{2}$-$1\frac{1}{2}$" wide. Spike $\frac{3}{4}$-$1\frac{1}{2}$" long. O. pedunculosum.

38. **MARATTIA** Smith.

Rhizome large, thick and swollen. Fronds numerous, large, 2–3-pinnate ; stipes stout, articulated at the base, and furnished with two adnate auricles. Veins all free. Sori oblong, placed at or near the tip of the veins, close to the margin of the pinnules, each sorus consisting of two parallel rows containing 4–12 sporangia, the sporangia of each row completely united into a boat-shaped mass called a synangium. Synangia coriaceous, the outer face smooth and convex, the inner flat and pierced by the narrow transverse slits of the dehiscent sporangia. Spores globose-tetrahedral.

A small genus of about 20 species, widely scattered through the tropical regions of both hemispheres and the warmer part of the South Temperate Zone. The single New Zealand species is found in Australia and Polynesia, South Africa, Malaya, Philippines, and India.

1. **M. fraxinea** *Smith Ic. Ined.* (1790) t. 48.—Rhizome a large irregularly shaped tuberous mass. Stipes stout, 1–2 ft. long or more, brownish-green, jointed at the base and furnished with large clasping auricles which are persistent on the rhizome. Fronds large, in fully grown specimens 6–12 ft. long, 2–5 ft. broad, ovate-deltoid, dark-green and glossy, coriaceous, 2-pinnate or rarely 3-pinnate. Primary pinnae 9 in. to 3 ft. long, often more than 1 ft. broad ; pinnules shortly stalked, 3–6 in. long, $\frac{1}{2}$–1 in. broad, lanceolate or oblong-lanceolate, acuminate, obliquely cuneate or rounded at the base ; margins minutely serrulate ; costa slightly scaly. Veins rather close, parallel, simple or sparingly forked. Sori oblong, brownish, $\frac{1}{1}$
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1. **O. coriaceum** *A. Cunn. Precur.* (1836) n. 161.—Rhizome cylindric, suberect, slightly tuberous, roots fleshy. Fronds 1–2 (or rarely 3) from the rhizome, 1–3 in. long including the petiole and fertile spike; sterile lamina usually placed below the middle, $\frac{1}{4}$–2 in. long, $\frac{1}{6}$–$\frac{1}{3}$ in. broad, lanceolate to ovate-lanceolate, acute or obtuse or shortly apiculate, narrowed into a long cuneate base, fleshy or almost coriaceous; veins indistinct, reticulated in narrow areoles. Fertile spike $\frac{1}{4}$–$\frac{3}{4}$ in. long, on a slender peduncle which usually much exceeds the sterile lamina when mature. Sporangia 7–15 in each row.—*Presl Suppl.* (1845) 49; *Prantl Beit. Syst. Ophiog.* (1884) 314, t. 7, f. 9, 10, 11. O. gramineum *R. Br. Prodr.* (1810) 163 (*but not of Willd.*). O. lusitanicum *Hook. and Bak. Syn. Fil.* (1874) 445; *Thoms. N.Z. Ferns* (1882) 98; *Field N.Z. Ferns* (1890) 155, t. 21, f. 7 (*but not of Linn.*). O. vulgatum *vars.* gramineum, lusitanicum, *and* minimum *Hook. f. Fl. Nov. Zel.* i (1855) ii, 50; *Handb. N.Z. Fl.* (1864) 386. O. minimum *Col. ex Hook. and Bak.* (1874) 445. O. minimum *Armstr. in Trans. N.Z. Inst.* xiii (1881) 342.

Kermadec Islands, North and South Islands: Not uncommon in grassy places throughout, ascending to 3500 ft.

This, so far as New Zealand is concerned, consists of the varieties *gramineum*, *lusitanicum*, and *minimum* of the Flora and the Handbook. The two first are now considered to form a distinct species under Cunningham's name of *O. coriaceum*, of which Armstrong's *O. minimum* is probably a depauperated state. *O. coriaceum* is also known from Australia, Tasmania, Easter Island (Skottsberg), and Bolivia.

2. **O. pedunculosum** *Desv. in Berl. Mag.* v (1811) 306.—Rhizome short, cylindrical; roots long, fleshy. Fronds 1–2 from the rhizome, rarely more. Petiole above the ground; peduncle arising from the petiole; total length of frond, including the petiole and fertile spike, 4–12 in. Sterile lamina placed near the middle or slightly below it, $\frac{3}{4}$–3 in. long, $\frac{1}{2}$–1 in. broad, ovate or ovate-lanceolate or ovate-rhomboid, obtuse or subacute, truncate or broadly cuneate at the base, never cordate, rather fleshy, venation reticulated. Fertile spike $\frac{3}{4}$–$1\frac{1}{2}$ in. long on a slender peduncle inserted just below the sterile lamina and much overtopping it. Sporangia very variable in number, 15–40 in each row.—*Presl Suppl.* (1845) 54. O. elongatum *R. Cunn. in A. Cunn. Precur.* (1836) n. 161. O. vulgatum *Hook. f. Fl. Nov. Zel.* ii (1855) 50 (*not of Linn.*); *Handb. N.Z. Fl.* (1864) 386; *Hook. and Bak. Syn. Fil.* (1874) 445; *Thoms. N.Z. Ferns* (1882) 98; *Field N.Z. Ferns* (1890) 155, t. 21, f. 6. R. costatum *R. Br. Prodr.* (1810) 163.

North and South Islands, Chatham Islands: From the North Cape to Foveaux Strait, plentiful in moist grassy places, by the margins of swamps, &c. Sea-level to 2000 ft.

In the first edition of this work I followed Hooker and Baker in treating this plant as a form of the well-known *O. vulgatum;* but now most pteridologists split up that species into a considerable number of others with more restricted ranges. Most of the New Zealand forms agree with Cunningham's *O. elongatum*, which is now kept up as a distinct species by Christensen under the much older name of *O. pedunculosum* Desv., and which ranges from New Zealand and Australia northwards to Malaya, Ceylon, India, Philippines, and Japan.

40. **BOTRYCHIUM** Swartz.

Rhizome short, suberect, emitting numerous long fleshy branching roots. Fronds solitary or rarely two at the top of the rhizome, not circinate, stipitate, thick and fleshy, composed of two divisions: the posterior sterile,

pinnate or 2–3-pinnate or decompound; the anterior fertile, of numerous branched spikes forming a pedunculate panicle, the peduncle usually long, inserted on the petiole below the sterile lamina. Sporangia closely packed and sessile in two rows along the branches of the panicle, free, globose, not annulate, dehiscing by a transverse slit; spores numerous, tetrahedral.

Species variously estimated at from 10 to 30, according to the different views of authors. Found in most temperate or extratropical regions, rare in very hot climates. Both the New Zealand species are widely distributed.

Sterile segment of the frond simply pinnate; fertile bipinnate ..	1. *B. lunaria.*
Sterile and fertile segments both decompound	2. *B. australe.*

1. **B. lunaria** *Swartz Syn. Fil.* (1806) 110.—Rhizome short, tuberous. Fronds solitary at the top of the rhizome or rarely 2 together, 3–6 in. high; stipes stout, terete, glabrous, with 1 or 2 brownish sheathing scales at the base. Sterile lamina at about the middle of the frond, ¾–3 in. long, ½–1 in. broad, oblong or linear-oblong, rather fleshy, simply pinnate; pinnae 3–6 pairs, close-set, lunate or flabellate, entire or more or less deeply crenate-toothed. Veins flabellate, radiating from the base. Fertile segment equalling or exceeding the sterile, pedunculate, ½–3 in. long, lanceolate-deltoid, 2-pinnate; the divisions all turned to one side, narrow, thickly covered with the yellowish sporangia.—*Hook. f. Fl. Tasm.* ii (1860) 154; *Hook. and Bak. Syn. Fil.* (1873) 447; *Benth. Fl. Austral.* vii (1878) 690; *Enys in Trans. N.Z. Inst.* xvi (1884) 363; *T. Kirk l.c.* 366; *Field N.Z. Ferns* (1890) 166, t. 21, f. 8; *Cheesem. Man. N.Z. Fl.* (1906) 1028.

South Island: Canterbury—South-western slopes of Mount Torlesse, alt. 2700 ft., *J. D. Enys!*

Not uncommon in the temperate and cool mountainous portions of the Northern Hemisphere, and in Patagonia and Australia in the Southern. The few New Zealand specimens that I have seen are much under the average size of the species in Europe or North America, but I can see no other difference.

2. **B. australe** *R. Br. Prodr.* (1810) 164.—Rhizome short, stout, emitting numerous long and fleshy almost tuberous roots. Fronds solitary, 6–18 in. long or more. Stipes 1–3 in. long from the rhizome to the forking of the sterile and fertile segments, stout, thick and fleshy, terete. Sterile segment long-peduncled, variable in size, usually from 3–6 in. broad and long, but large specimens sometimes reach 9–12 in., and small ones are often dwarfed to less than 2 in., broadly deltoid, tripartite at the base, the divisions usually petiolate, 2–4-pinnate; the ultimate pinnules oblong or ovate, toothed or crenate or almost entire; texture thick and fleshy. Fertile segment on a stout or slender peduncle 4–12 in. long or more, usually overtopping the sterile segment; panicle 1½–6 in. long, nearly as broad at the base, much branched, 3–4-pinnate. Sporangia very numerous.—*A. Cunn. Precur.* (1836) n. 160; *Raoul Choix* (1846) 37; *Prantl Syst. Ophiogl.* (1883) 340. B. ternatum *Hook. and Bak. Syn. Fil.* (1873) 448; *Benth. Fl. Austral.* vii (1878) 690; *Thoms. N.Z. Ferns* (1882) 99; *Field N.Z. Ferns* (1890) 157, t. 20, f. 5, 5a; *Cheesem. Man. N.Z. Fl.* (1906) 1029 (*not of Thunb.*). B. virginianum *Hook. f. Fl. Nov. Zel.* ii (1855) 50 (*not of Swartz*). B. cicutarium *Hook. f. Handb. N.Z. Fl.* (1864) 387 (*not of Swartz*).

Var. **millefolium** *Prantl Syst. Ophiogl.* (1883) 341. — Frond more slender; sterile segment much more finely divided, the ultimate pinnules laciniately cut into narrow lobes and teeth. — B. biforme *Col. in Trans. N.Z. Inst.* xviii (1886) 223. B. cicutarium *var.* dissectum *Hook. f. Handb. N.Z. Fl.* (1864) (*not of Muhl.*).

North and South Islands, Chatham Islands: The ordinary form abundant from the North Cape to the south of Otago; var. *millefolium* often local. Sea-level to 3500 ft.

Also in Australia, Tasmania, and extratropical South America, and very closely allied to the northern *B. ternatum*, with which it was united by Hooker and Baker in the "Synopsis Filicum."

Family II. **MARSILEACEAE.**

Perennial plants, usually of small size, growing in marshes or in damp soil. Rhizome slender, creeping, rooting at the nodes. Leaves solitary or in tufts at the nodes of the rhizome, either filiform or of 4 leaflets borne at the top of a slender petiole. Sporocarps or conceptacles globose or oblong, on short peduncles which rise from the petioles or near their bases, each sporocarp containing numerous (*Marsilea*) or few (*Pilularia*) cavities or cells, and each cell containing a group or sorus composed of macrosporangia and microsporangia. Macrosporangia containing a single macrospore; microsporangia containing numerous microspores.

A small order of 2 genera and 50 or 60 species, found in most temperate and tropical countries. In germination a small female prothallium is developed within the macrospore, which eventually bursts, the prothallium protruding from the opening. A single archegonium is then formed on the prothallium, which is fertilized by spermatozoids set free by the bursting of the microspores, within which a rudimentary male prothallium bearing a single antheridium has been developed.

1. **PILULARIA** Linn.

Rhizome long, filiform, creeping and rooting. Leaves solitary at the nodes of the rhizome, circinate in vernation, filiform, erect. Sporocarps on short peduncles, globose, 2–4-celled, splitting at the top into as many valves as cells; each cell with a longitudinal parietal placenta bearing in the upper portion microsporangia containing numerous microspores, and below these few or many macrosporangia containing a solitary macrospore.

A small genus of 6 species, found in the temperate or subtropical regions of both hemispheres. The New Zealand species is endemic.

1. **P. novae-zealandiae** *T. Kirk in Trans. N.Z. Inst.* ix (1877) 547, t. 29.—Very slender. Leaves distant, $\frac{3}{4}$–2 in. long. Peduncle about $\frac{1}{4}$ in. long, erect. Sporocarp $\frac{1}{6}$ in. diam., globose, densely hairy, 2-celled and 2-valved. Macrosporangia 10–12 to each cell, subglobose, not constricted at the middle.—*Thoms. N.Z. Ferns* (1882) 100; *Bak. Fern Allies* (1887) 148; *Cheesem. Man. N.Z. Fl.* (1906) 1030.

North Island: Auckland—Lake Whangape, *T. Kirk.* South Island: Canterbury—Lake Lyndon, Lake Pearson, and other lakes in the Waimakariri district, *T. Kirk! Enys! Berggren, T. F. C.*

Probably not an uncommon plant, but very easily overlooked.

Family III. **SALVINIACEAE.**

Fugacious annuals, of small size, floating in quiet waters. Stems simple or branched. Leaves small, often minute, apparently distichous, sessile or shortly petiolate, simple or lobed. Sporocarps or conceptacles on the under-surface of the stem, either clustered on the divisions of an altered submerged leaf, or in pairs in the axils of the leaves, globose or ovoid, membranous, indehiscent, of two kinds, both borne on the same plant; one kind containing a single or many macrosporangia, the other enclosing numerous microsporangia. Macrosporangia containing a single macrospore; microsporangia with numerous microspores.

Genera 2; species about 18, mainly tropical or subtropical. In germination the macrospore produces a rather large prothallium, which remains attached to it, and which bears one or more archegonia. The microspores each develop a rudimentary prothallium bearing a single antheridium containing spermatozoids, fertilization taking place in the same way as in ferns. In the genus *Salvinia*, which is not found in New Zealand, the antheridia are formed while the microspores are contained within the microsporangium; but in *Azolla* the microspores escape in groups called massulae, each with its proper membrane, and the antheridia are developed within the massulae.

1. **AZOLLA** Linn.

Floating water-plants. Stems copiously pinnately branched, emitting on the under-side numerous rootlets. Leaves densely imbricating, very minute, sessile, deeply and unequally 2-lobed. Sporocarps or conceptacles in pairs in the axils of the leaves on the under-surface of the stem, of two kinds: one kind larger, globose, enclosing numerous microsporangia, each of which contains numerous microspores arranged in separate groups or massulae furnished with a membranous envelope; the other smaller, ovoid, containing a single macrosporangium within which is a solitary macrospore. Macrospores each crowned with few or many swimming-floats; massulae of the microspores armed with simple or hooked bristles.

A small genus of 4 or 5 species, found in most tropical or warm temperate regions.

1. **A. rubra** *R. B. Prodr.* (1810) 167.—Floating, red or reddish-green, often gregarious and covering large sheets of water; the separate plants ½–1 in. long, orbicular or ovate or somewhat deltoid, copiously bipinnate. Leaves densely imbricating, about $\frac{1}{20}$ in. long, 2-lobed, the lobes ovate, obtuse. Larger sporocarps globose, about $\frac{1}{20}$ in. diam.; the massulae of the microspores armed with copious hooked bristles. Smaller sporocarps hardly more than half the size, oblong; the solitary macrospore crowned with 3 swimming-floats.—*Hook. f. Fl. Nov. Zel.* ii (1855) 56; *Handb. N.Z. Fl.* (1864) 392; *Benth. Fl. Austral.* vii (1878) 680; *Bak. Fern Allies* (1887) 137; *Cheesem. Man. N.Z. Fl.* (1906) 1031.

North and South Islands, Stewart Island: Abundant in still waters throughout.

Also found in Australia and Tasmania, and very closely allied to the South American *A. filiculoides* Lam., of which some authors consider it to be a variety.

Family IV. **LYCOPODIACEAE.**

Perennials, from a few inches to a few feet high. Stems erect or pendulous, or prostrate or creeping, simple or more usually dichotomously branched, often hard and wiry, usually leafy throughout. Leaves small, simple, entire or serrulate, more or less decurrent at the base, indistinctly

1-nerved, either spreading all round the axis and of the same shape and size, or dimorphous with the larger ones distichously spreading. Sporangia all of one kind, coriaceous, 1-celled in the typical genera, 2–3–4-celled in *Tmesipteris* and *Psilotum*, borne singly on the upper base of fertile leaves or sporophylls. Sporophylls either similar to the foliage-leaves and placed all down the stem, or more or less reduced in size and bract-like and aggregated into terminal spikes or cones, in *Tmesipteris* and *Psilotum* deeply bifid with the sporangia attached below the fork. Spores all of one kind, numerous, tetrahedral, marked with 3 radiating lines at the tip.

A family containing 4 genera and over 125 species, quite cosmopolitan in its distribution, and without any important economical properties or uses. The germination of the spores has so far been observed in only a comparatively small proportion of the species. The prothallium is monoecious, as in ferns, producing both archegonia and antheridia, but the species which have been examined exhibit great diversities in the shape and mode of growth of the prothallium and in its duration; and considerable variety also exists in the development of the embryonic plant. For particulars reference must be made to special text-books or memoirs. As a matter of convenience, I have retained *Tmesipteris* and *Psilotum* in the order, but the structure of the sporangia and form of the sporophylls are so distinct that there can be little doubt that Pritzel and other authors are right in placing them in a distinct family.

A. Lycopodiineae. *Fertile leaves or sporophylls (bracts) simple, not forked. Sporangia reniform, compressed, 1-celled, dehiscing by a longitudinal slit.*

Minute. Stem reduced to a small tuber crowned by subulate leaves. Sporangia forming a cone-like spike at the top of a naked peduncle .. .. 1. PHYLLOGLOSSUM.

Larger. Stem conspicuous, branched, leafy throughout. Sporangia collected into terminal or lateral spikes, rarely scattered along the branches. .. .. 2. LYCOPODIUM.

B. Psilotineae. *Fertile leaves or sporophylls forked. Sporangia (synangia) 2–3–4-celled and valved, attached to the sporophylls below the fork.*

Stems simple or rarely forked. Leaves conspicuous, vertical. Synangia boat-shaped, 2-celled .. .. 3. TMESIPTERIS.

Stems many times dichotomous. Leaves minute, scale-like. Synangia subglobose, usually 3-celled .. .. .. 4. PSILOTUM.

The life-history of the *Lycopodiaceae* of New Zealand has been fully and ably investigated by the Rev. J. E. Holloway in a series of memoirs contributed to the *Transactions of the New Zealand Institute*, as follows: "Studies in the New Zealand Species of *Lycopodium*," Part I, vol. xlviii, 1916; Part II, "Methods of Vegetative Reproduction," vol. xlix, 1917; Part III, "The Plasticity of the Species," vol. li, 1919; "The Prothallus and Young Plant of Tmesipteris," vol. l, 1918; Part IV, "The Structure of the Prothallus in Five Species," vol. lii, 1920; and "Further Studies on the Prothallus of Tmesipteris," vol. liii, 1921. No student of the family can afford to neglect these important contributions. I have also to tender my acknowledgments to Mr. Holloway for valuable assistance rendered in the preparation of this work.

1. **PHYLLOGLOSSUM** Kunze.

A small stemless plant, consisting of an oblong tuber (protocorm) which is annually reproduced, and which bears at its apex a tuft of terete subulate leaves. Roots few, simple, springing from above the tuber directly below the leaves. Peduncle arising from the apex of the tuber and surrounded at its base by the leaves, short, erect, simple or very rarely forked, ending in a short fertile spike or cone. Bracts several, imbricated, broadly ovate, cuspidate, each supporting a single reniform 1-celled sporangium, which dehisces by a longitudinal slit. Spores small, numerous, with three lines radiating from the apex.

A genus of a single species, found in New Zealand, Tasmania, Victoria, and West Australia.

1. **P. Drummondii** *Kunze in Bot. Zeit.* (1843) 721.—Whole plant 1–2½ in. high, green, perfectly glabrous. Tuber small, oblong, producing another (rarely two more) during the growing season, the new tuber remaining dormant during the summer and reproducing the plant the following winter, the original tuber and its leaves shrivelling after the ripening of the sporangia. Leaves usually from 4–10, but varying in number from 1 or 2 to 15 or even 20, ⅛–¾ in. long, linear-subulate, acute, fleshy, cylindrical. Peduncle 2 or 3 times as long as the leaves, stout, erect. Spike ⅙–⅓ in. long, oblong-ovoid, terete; bracts 10–30, broad, the erect cusp overtopping the sporangium.—*Hook. Ic. Plant.* (1854) t. 908; *Hook. f. Fl. Nov. Zel.* ii (1855) 51; *Fl. Tasm.* ii (1860) 154; *Handb. N.Z. Fl.* (1864) 388; *Bak. Fern Allies* (1887) 7; *Thoms. N.Z. Ferns* (1882) 102; *Cheesem. Man. N.Z. Fl.* (1906) 1033. Lycopodium sanguisorba *Spring. Monog. Lycop.* ii (1848) 36.

North Island: Barren clay hills from the North Cape to the Thames Valley and the Middle Waikato (Lake Waikare), not uncommon. South Island: Said to have been gathered near Picton by *Helms*, and on Banks Peninsula by *Armstrong*, but I have seen no specimens.

A remarkable little plant, differing from all other Lycopods in its vegetative characters, but with the spike and sporangia of *Lycopodium*. The tuber and its leaves are so similar in appearance and mode of development to the embryonic plant of some species of *Lycopodium*, and notably to that of *L. cernuum*, with its protocorm or embryonic tubercle, and protophylls or primordial leaves, that both Bower and Treub have expressed the opinion that *Phylloglossum* should be regarded as a permanently embryonic form of Lycopod. The important discovery made by Thomas that the prothallium and development of the embryo is of the same type as that of *Lycopodium cernuum* may be regarded as a satisfactory proof of the correctness of this view; and it seems in every way probable that Thomas is correct in considering *Phylloglossum* to be the most primitive of existing *Lycopodiaceae*. For information on the subject the student should consult Professor Bower's two memoirs "On the Development and Morphology of *Phylloglossum Drummondii*" and "On the Morphology of the Spore-producing Members" (Trans. Roy. Soc. 1886, p. 665, and 1894, p. 508–10); also Treub's paper in the Annals of the Bot. Garden of Buitenzorg, vol. viii, p. 1 *et seq.*; and Professor Thomas's "Preliminary Account of the Prothallium of *Phylloglossum*" (Proc. Roy. Soc., vol. lxix, p. 285–91, reprinted in Trans. N.Z. Inst. xxxiv, 402–8). Other papers on the subject will be found in the "Annals of Botany" and the *Botanical Gazette*.

2. **LYCOPODIUM** Linn.

Stems erect or pendulous, or prostrate and creeping, copiously branched, rarely simple, often hard and wiry, usually leafy throughout. Leaves small, crowded or imbricate, 1-nerved, entire or denticulate, generally uniform in size and multifarious, but in a few species dimorphous and distichous. Sporangia 1-celled, reniform, compressed, coriaceous, dehiscing by a longitudinal slit, placed singly on the upper surface of the leaves near their base, or more generally at the upper base of imbricated bracts aggregated into terminal spikes, which are either sessile or pedunculated. Spores small, numerous, with three lines radiating from the apex.

A large genus of about 100 species, found in all parts of the world. Of the 11 species indigenous in New Zealand, 3 are widely distributed in both hemispheres, 6 extend to Australia, 2 of them reaching the Pacific islands as well, the remaining 1 or 2 are endemic.

A. Selago. *Leaves multifarious. Sporangia at the upper base of unaltered leaves at intervals all down the stem.*

Stems 3–12 in., tufted, erect, dichotomously forked. Leaves crowded, erect, subulate-lanceolate, ⅙–¼ in. long .. .. 1. *L. Selago.*

B. Lepidotis. *Leaves multifarious. Sporangia aggregated into distinct terminal spikes, at the upper base of bracts differing in shape and size from the leaves.*

* Epiphytic or rupestral, rarely terrestrial. Stems often pendulous, dichotomously forked from the base. Spikes slender, tetragonous.

Stems 6–24 in., usually erect, stout, rigid. Spikes 2–6 in., stout, curved; bracts about $\frac{1}{8}$ in., the upper decidedly longer than the sporangia .. .. 2. *L. varium.*
Stems 1–5 ft., pendulous, very slender. Spikes 1–4 in.; bracts $\frac{1}{20}$–$\frac{1}{12}$ in., the upper scarcely longer than the sporangia .. 3. *L. Billardieri.*

** Stems erect, rigid, dendroid, simple below, copiously branched above. Spikes terminal, sessile, cylindrical.

Stems 1–3 ft.; branches ascending, dense, fastigiate. Spikes $\frac{1}{2}$–1 in., erect; bracts broadly ovate, acute but not cuspidate 4. *L. densum.*
Stems $\frac{3}{4}$–2 ft.; branches spreading. Spikes $\frac{1}{4}$–$\frac{1}{2}$ in., incurved or pendulous; bracts broadly ovate with a long cuspidate point 5. *L. cernuum.*

*** Stems slender, erect or procumbent, sparingly or diffusely branched. Spikes lateral or terminal on short lateral branchlets.

Stems 4–18 in., erect, simple or dichotomously forked; branches erect. Spikes lateral, sessile, $\frac{1}{2}$–$\frac{2}{3}$ in. long .. .. .. 6. *L. laterale.*
Stems 2–9 in., procumbent or prostrate, much branched, often with the branches interlaced. Spikes terminating short lateral branchlets .. .. 7. *L. ramulosum.*

**** Main stem creeping, with erect or ascending branches. Spikes terminal, on long peduncles.

Stems 2–6 in., creeping and rooting, leafy; fertile branches or peduncles simple, strict, erect, 2–6 in. long. Spikes $\frac{1}{3}$–$\frac{1}{2}$ in. .. 8. *L. Drummondii.*
Stems 6–24 in., creeping; branches 3–14 in., erect or ascending, fastigiately branched. Spikes $\frac{3}{4}$–2 in. long, on peduncles terminating the upper branchlets.. .. .. .. 9. *L. fastigiatum.*

C. Diphasium. *Leaves distichous and dimorphous. Sporangia aggregated into distinct terminal spikes; bracts small.*

Stems 1–3 ft., creeping; branches 3–12 in., ascending or erect, flattened. Spikes 1–2 in., solitary, terminal; bracts with spreading tips .. .. 10. *L. scariosum.*
Stems 2–8 ft., scrambling or climbing; branches flabellately divided, flattened. Spikes 1–4 in., in large panicles at the ends of the branches; bracts with small appressed tips .. 11. *L. volubile.*

1. **L. Selago** *Linn. Sp. Plant.* (1753) 1565.—Stems 3–12 in. long, usually shortly decumbent and rooting at the base, erect above, several times dichotomously forked, densely leafy throughout; branches 2–9 in. long, $\frac{1}{4}$–$\frac{1}{2}$ in. diam. including the leaves, stout, rigid, erect, cylindric, often uniform in height and forming dense level-topped tufts. Leaves crowded, ascending or rarely spreading, $\frac{1}{6}$–$\frac{1}{4}$ in. long, subulate-lanceolate, acuminate, sometimes almost pungent, quite entire or minutely denticulate, firm, dark-green and glossy, sometimes with pedicelled leafy bulbils in the axils. Sporangia solitary on the upper surface of the unaltered leaves near their base, often at intervals all down the stem, but usually most abundant in the upper part, not forming a distinct spike.—*Hook. f. Fl. Nov. Zel.* ii (1855) 52; *Fl. Tasm.* ii (1860) 155, t. 170A; *Handb. N.Z. Fl.* (1864) 389; *Benth. Fl. Austral.* vii (1878) 674; *Bak. Fern Allies* (1887) 9; *Thoms. N.Z. Ferns* (1882) 108; *Cheesem. Man. N.Z. Fl.* (1906) 1035.

North Island: Mountainous districts from Mount Tauhara (near Lake Taupo) southwards to the Tararua Range, apparently local. South Island, Stewart Island: Abundant in mountain districts, usually between 1500 and 5000 ft., but descends almost to sea-level in Stewart Island.

An abundant plant on moors and heaths in cool or damp mountainous localities throughout the world.

2. **L. varium** *R. Br. Prodr.* (1810) 165.—Stems tufted, much branched from the base, ½–2 ft. long, stout, rigid, erect or more rarely pendulous, sparingly or much dichotomously branched, leafy throughout; branches stout, often curved. Leaves crowded all round the branches, ascending or spreading, the lower ones the longest, ⅓–⅔ in. long, lanceolate, obtuse or subacute, coriaceous, dark-green and glossy, midrib usually obscure; upper leaves smaller and more appressed. Spikes terminal, usually numerous, simple or branched, curved or drooping, tetragonous, 2–6 in. long, ⅛–⅙ in. diam. Bracts densely imbricating, about ⅛ in. long, broadly ovate, acute or obtuse, keeled; the lower ones rather longer and more foliaceous, gradually passing into the upper leaves, the upper decidedly longer than the reniform sporangia.—*Hook. and Grev. Ic. Fil.* (1829) t. 112; *Hook. f. Fl. Antarct.* i (1844) 115; *Fl. Nov. Zel.* ii (1855) 52; *Fl. Tasm.* ii (1860) 155, t. 170B; *Handb. N.Z. Fl.* (1864) 389; *Benth. Fl. Austral.* vii (1878) 674; *Bak. Fern Allies* (1887) 21; *Thoms. N.Z. Ferns* (1882) 104; *Cheesem. Man. N.Z. Fl.* (1906) 1035.

North and South Islands, Stewart Island, Chatham Islands, Auckland and Campbell Islands, Antipodes Island, Macquarie Island: Mountainous districts from the Great Barrier Island and Cape Colville southwards, not uncommon. Sea-level to 4500 ft.

Also in Australia and Tasmania. Possibly only an extreme form of *L. Billardieri*, into which it passes by imperceptible gradations, but in its usual state distinguished without much difficulty by the stout rigid habit, stouter curved spikes, and larger bracts. It is usually terrestrial or rupestral, rarely epiphytic. In Stewart Island it occasionally forms large patches sometimes 10 or 12 ft. across.

3. **L. Billardieri** *Spring. Monog. Lycop.* i (1841) 56.—Stems tufted, pendulous from the branches of trees or from rocks, more rarely growing on peaty soil or on humus, 1–5 ft. long, excessively dichotomously branched from the base upwards, slender, cylindric, dark-green, leafy throughout; upper branches almost flaccid. Lower leaves laxly placed, spreading or ascending from an erect decurrent base, ½–¾ in. long, linear or linear-ligulate, obtuse or acute, coriaceous, usually with a distinct midrib; upper shorter and more closely placed, more erect, often appressed and imbricating, ¼ in. long, linear-subulate, acute, more or less keeled. Spikes terminating the branches, very numerous, slender, dichotomously forked, tetragonous, 1–4 in. long, $\frac{1}{12}$–$\frac{1}{10}$ in. diam. Bracts densely imbricating, short, $\frac{1}{25}$–$\frac{1}{15}$ in. long, broadly ovate, acute or apiculate, keeled, the upper ones sometimes no longer than the reniform sporangia.—*Hook. f. Fl. Nov. Zel.* ii (1855) 53; *Handb. N.Z. Fl.* (1864) 389; *Bak. Fern Allies* (1887) 20; *Thoms. N.Z. Ferns* (1882) 104; *Cheesem. Man. N.Z. Fl.* (1906) 1036. L. varium *var.* Billardieri *T. Kirk in Trans. N.Z. Inst.* xvi (1884) 377. L. flagellaria *A. Rich. Fl. Nouv. Zel.* (1832) 60 (*not of Bory*); *A. Cunn. Precur.* (1836) n. 155; *Raoul Choix* (1846) 37. L. Phlegmaria *A. Cunn. Precur.* (1836) n. 157 (*not of Linn.*).

Var. **gracile** *T. Kirk in Trans. N.Z. Inst.* xvi (1884) 377.—Stems tufted, usually pendulous, 6–12 in. long, slender, pale-green, flaccid. Leaves spreading, about ½ in. long, narrow-linear, acute or obtuse. Spikes lax, slender, often ill-defined, 3–6 in. long, simple or forked. Bracts about ¼ in. long, linear, spreading or ascending, 3 or 4 times as long as the sporangia.—(?) L. novae-zealandicum *Col. in Trans. N.Z. Inst.* xix (1887) 275.

Kermadec Islands, North and South Islands, Stewart Island: The typical form abundant in woods throughout. Var. *gracile:* Mount Egmont, *T. F. C.;* Wairarapa Valley, *J. S. Sandager!* Maitai Valley, *Dr. Boor* and *T. Kirk;* Westport,

Dr. Gaze! Otira Gorge, *T. F. C.* Very abundant in Westland, especially on the trunks of *Dicksonia squarrosa, Holloway!* Sea-level to 2000 ft.

A very variable plant, which cannot be separated by any positive characters from *L. varium*. Var. *gracile* is more distinct, and might almost be distinguished as a separate species.

4. **L. densum** *Labill. Pl. Nov. Holl.* ii (1806) 104, t. 251.—Rhizome long, stout, subterranean, frequently 4–6 ft. in length. Stems rigidly erect, woody, dendroid, 1–4 ft. high, or even more when drawn up by surrounding vegetation, simple below, much and densely fastigiately branched above; branches repeatedly divided; branchlets slender, ascending, $\frac{1}{16}$–$\frac{1}{8}$ in. diam. Leaves inserted all round the stem and branches, distant towards the base of the stem, much closer together above. There are three distinct types of foliage, usually confined to separate branches, that most generally seen being erect, densely imbricating and closely appressed to the branch, $\frac{1}{20}$–$\frac{1}{12}$ in. long, subulate-lanceolate and shortly aristate. In the other types the foliage is larger, and erecto-patent or squarrose. Spikes solitary and terminal on the branchlets, very numerous, erect, $\frac{1}{2}$–1 in. long, about $\frac{1}{8}$ in. diam., cylindric, obtuse. Bracts close-set, broadly ovate, acute but not cuspidate, spreading when mature; margins scarious, jagged. Spores echinate—*A. Cunn. Precur.* (1836) n. 153; *Raoul Choix* (1846) 37; *Hook. f. Fl. Nov. Zel.* ii (1855) 53; *Handb. N.Z. Fl.* (1864) 389; *Benth. Fl. Austral.* vii (1878) 676; *Bak. Fern Allies* (1887) 24; *Cheesem. Man. N.Z. Fl.* (1906) 1036.

North Island: Abundant from the North Cape to Poverty Bay and Kawhia, usually in light scrub on clay soils. South Island: Marlborough, *Buchanan.* Nelson—Lower Takaka, Denniston (near Westport), *J. E. Holloway!* Chatham Islands: *Dieffenbach.* Sea-level to 3000 ft.

Also in Norfolk Island, Australia and Tasmania, and New Caledonia. I had supposed that the differences in foliage represented sterile or juvenile branches, but Mr. Holloway informs me that such differences do not depend upon whether the plant is young or old, sterile or fertile.

5. **L. cernuum** *Linn. Sp. Plant.* (1753) 1566.—Stems stout, creeping by successive loops which root at the nodes, 1–10 ft. long, leafy throughout; primary branches rigidly erect, 9–18 in. long or more, much branched in the upper portion, usually simple below; lower branchlets copiously divided, short, spreading or ascending, pendulous towards the tips. Leaves inserted all round the stems and branches, crowded, squarrose or incurved towards the tips, $\frac{1}{10}$–$\frac{1}{8}$ in. long, narrow linear-subulate, decurrent at the base, pale soft-green, keeled by the prominent midrib beneath. Spikes numerous, solitary and sessile on the incurved or pendulous tips of the branchlets, $\frac{1}{4}$–$\frac{1}{2}$ in. long, oblong, obtuse, cylindric. Bracts imbricating all round, broadly ovate, narrowed into a long cuspidate point; margins denticulate.—*A. Cunn. Precur.* (1836) n. 154; *Raoul Choix* (1846) 37; *Hook. f. Fl. Nov. Zel.* ii (1855) 54; *Handb. N.Z. Fl.* (1864) 390; *Benth. Fl. Austral.* vii (1878) 676; *Bak. Fern Allies* (1887) 23; *Thoms. N.Z. Ferns* (1882) 105; *Cheesem. Man. N.Z. Fl.* (1906) 1037. (?) L. polycephalum *Col. in Trans. N.Z. Inst.* xvii (1885) 401.

Kermadec Islands: Sunday Island, in the large crater-basin, not common, *T. F. C., W. R. B. Oliver!* North Island: From the North Cape to the East Cape and Taupo, abundant to the north of the Thames and Waikato Rivers, and in great profusion in heated soil in the thermal-springs district, from Rotorua to Taupo. Sea-level to 2500 ft. South Island: West Wanganui, *B. C. Aston!*

A common tropical plant all round the world. Frequently luxuriating in the neighbourhood of hot springs.

6. **L. laterale** *R. Br. Prodr.* (1810) 165.—Rhizome long, stout, white, creeping, much branched. Stems numerous, erect or decumbent at the base, 4–24 in. high, stout or slender, simple or sparingly branched, the branches erect, cylindric, pale-green, sometimes tinged with reddish-brown, leafy from the base. Leaves close-set, spreading all round or the upper ascending, $\frac{1}{8}$–$\frac{1}{4}$ in. long, subulate-lanceolate, acuminate, decurrent at the base, firm but hardly coriaceous; midrib evident; margins revolute. Spikes 2–8 to a branch, lateral or sometimes terminal on very short leafy shoots, sessile, simple, erect, $\frac{1}{3}$–$\frac{2}{3}$ in. long, oblong, obtuse, often brown or reddish-brown. Bracts imbricated, spreading at maturity, broadly ovate, suddenly narrowed into a rather long acuminate point; margins jagged.—*A. Cunn. Precur.* (1836) n. 156; *Raoul Choix* (1846) 37; *Hook. f. Fl. Nov. Zel.* ii (1855) 53; *Handb. N.Z. Fl.* (1864) 389; *Benth. Fl. Austral.* vii (1878) 675; *Bak. Fern Allies* (1887) 28; *Thoms. N.Z. Ferns* (1882) 106; *Cheesem. Man. N.Z. Fl.* (1906) 1037. L. consimile *Col. in Trans. N.Z. Inst.* xvi (1884) 348.

North and South Islands, Chatham Islands: Abundant in swampy or peaty ground throughout. Sea-level to 2500 ft.

Also found in Australia, from Queensland to Victoria, and in New Caledonia.

7. **L. ramulosum** *T. Kirk in Trans. N.Z. Inst.* xi (1879) 456, t. 19B.—Rhizome creeping, branched. Stems 2–9 in. long, prostrate or procumbent, usually much branched and densely intermatted, but sometimes lax and open; branches ascending at the tips, pale-green, often tinged with reddish, leafy throughout. Leaves rather close, spreading or ascending, about $\frac{1}{6}$ in. long, subulate-lanceolate, mucronate, decurrent at the base, keeled, firm but scarcely coriaceous, quite entire. Spikes solitary and sessile at the end of short leafy branchlets, sometimes terminating the main branches; occasionally the branches are so much reduced that the spike becomes lateral as in *L. laterale*, $\frac{1}{4}$–$\frac{1}{2}$ in. long, oblong, obtuse, brown or reddish-brown. Bracts imbricated, ascending, broadly ovate, abruptly acuminate or cuspidate, coriaceous; margins entire or slightly toothed.—*Bak. Fern Allies* (1887) 25; *Thoms. N.Z. Ferns* (1882) 105; *Cheesem. Man. N.Z. Fl.* (1906) 1038; *Ill. N.Z. Fl.* ii (1914) t. 250.

South Island: Nelson—Vicinity of Westport, *W. Townson!* Westland—Very abundant in sphagnum bogs, *J. E. Holloway!* near Hokitika, *W. Tipler;* Kumara, *J. W. Brame!* Okarito, *A. Hamilton!* Stewart Island: Paterson's Inlet, *T. Kirk!* plentiful, *Cockayne!* Usually in open peaty land or in swampy woods. Sea-level to 3000 ft.

More closely allied to the Australian *L. diffusum* than to any other species, principally differing, as Mr. Baker has remarked, in its entirely terminal spikes, whereas in *L. diffusum* they are frequently lateral. In its usual state it is easily separated from *L. laterale* by its densely branched habit of growth and by the procumbent or prostrate stems.

8. **L. Drummondii** *Spring. Monog. Lycop.* ii (1848) 35.—Main stem creeping over the surface of the ground and producing copious roots, more or less branched, 3–6 in. long or even more, putting up here and there distant rigidly erect fertile branches 4–8 in. high. Leaves of the main stem uniform, crowded, dark-green, ascending, imbricate, linear-lanceolate, acuminate, quite entire, $\frac{1}{8}$ in. long; midrib faint; texture firm. Leaves of the fertile branches not so closely placed, erecto-patent. Spikes variable in length, 1–3 in. or even more. Bracts deltoid with a long cuspidate point, erecto-patent or the lower spreading, greenish-yellow.—*Bak. Fern Allies* (1887) 25; *Cheesem. Man. N.Z. Fl.* (1906) 1038. L. caroli-

nianum *Hook. f. Fl. Nov. Zel.* ii (1855) 54; *Handb. N.Z. Fl.* (1864) 390; *Benth. Fl. Austral.* vii (1878) 675; *Thoms. N.Z. Ferns* (1882) 106 (*not of Linn.*). L. serpentinum *Kunze in Pl. Preiss.* ii 108.

North Island: Auckland—Peaty swamp near the outlet of Lake Tongonge, near Kaitaia, North Cape district, *R. H. Matthews! H. B. Matthews! H. Carse!* The only locality known for the species in New Zealand, and no doubt the one in which it was originally discovered by Mr. Colenso in 1839. It is also a native of Australia, and is very closely allied to the tropical *L. carolinianum* Linn., principally differing in the stem-leaves being all similar, and not dimorphic.

9. **L. fastigiatum** *R. Br. Prodr.* (1810) 165.—Main stem or rhizome stout, creeping, subterranean, 6–24 in. long or more; primary branches rather distant, 3–14 in. long, stout, erect, rigid, often naked below, copiously fastigiately branched above; branchlets crowded. Leaves imbricated all round the branches, crowded, spreading and then incurved at the tips, $\frac{1}{8}$–$\frac{1}{6}$ in. long, linear or linear-lanceolate, acute or shortly mucronate, not hair-pointed, entire, firm, midrib indistinct. Spikes peduncled, often two together, terminating the upper branchlets or several in a central panicle, $\frac{3}{4}$–2 in. long, rarely more, about $\frac{1}{6}$ in. diam., erect, cylindric. Bracts closely imbricate, broadly ovate at the base, narrowed upwards into a long spreading or recurved cuspidate point.—*Bak. Fern Allies* (1887) 27; *Cheesem. Man. N.Z. Fl.* (1906) 1039. L. clavatum *var.* magellanicum *Hook. f. Fl. Antarct.* i (1844) 113; *Fl. Nov. Zel.* ii (1855) 54; *Handb. N.Z. Fl.* (1864) 390; *Thoms. N.Z. Ferns* (1882) 106 (*but not of Swartz*). L. clavatum *var.* fastigiatum *Benth. Fl. Austral.* vii (1878) 675. L. curvifolium *and* L. scopulosum *Col. in Trans. N.Z. Inst.* xx (1888) 234 *and* 235. L. decurrens *Col. l.c.* xxviii (1896) 617.

North Island: Hilly and mountainous localities from Cape Colville to Cook Strait, but local to the north of the East Cape. South Island, Chatham Islands, Stewart Island, Auckland and Campbell Islands, Antipodes Island: Abundant throughout. Sea-level to 5000 ft.

Also in Victoria and Tasmania, and very close to some forms of the widely distributed *L. clavatum* Linn., from which it is chiefly distinguished by the absence of hair-points to the leaves and their entire margins.

10. **L. scariosum** *Forst. f. Prodr.* (1786) n. 484.—Main stems prostrate or creeping, stout, branched, 1–3 ft. long; branches numerous, rigid, erect or ascending, copiously divided, 3–12 in. long; branchlets flattened, $\frac{1}{8}$–$\frac{1}{6}$ in. broad including the leaves. Leaves of the main stem inserted all round, appressed, lanceolate or subulate-lanceolate, with acute scarious tips; of the branchlets dimorphous, the larger distichously spreading and flattened, about $\frac{1}{8}$ in. long, ascending, much decurrent at the base, lanceolate or ovate-lanceolate, acute or acuminate, falcate, coriaceous, dark-green or yellow-green; smaller leaves on one side of the branchlets subulate-lanceolate, appressed, usually with scarious tips. Spikes solitary at the end of the branchlets, 1–2 in. long, about $\frac{1}{6}$ in. diam., on long or short peduncles clothed with appressed imbricate leaves. Bracts closely imbricated, broadly ovate at the base, narrowed upwards into a long spreading or recurved scarious tip; margins often toothed.—*Hook. Ic. Plant.* (1854) t. 966; *Raoul Choix* (1846) 37; *Hook. f. Fl. Antarct.* i (1844) 112; *Fl. Nov. Zel.* ii (1855) 55; *Handb. N.Z. Fl.* (1864) 390; *Benth. Fl. Austral.* vii (1878) 676; *Bak. Fern Allies* (1887) 29; *Thoms. N.Z. Ferns* (1882) 107; *Cheesem. Man. N.Z. Fl.* (1906) 1039. L. Lessonianum *A. Rich. Fl. Nouv. Zel.* (1832) 59; *A. Cunn. Precur.* (1836) n. 152. L. distans *Col. in Trans. N.Z. Inst.* xx (1888) 236.

North and South Islands, Chatham Islands, Stewart Island, Auckland Islands: From the Great Barrier Island and the Manukau Harbour southwards, but often local. Sea-level to 5000 ft.

A handsome and distinct species, a slightly different form of which is found in Victoria and Tasmania. It is also very closely allied to the South American *L. Jussiaei* Desv.

11. **L. volubile** *Forst. f. Prodr.* (1786) n. 482.—Stems 2–12 ft. long or more, branched, scrambling over bushes or rocks, slender, wiry, flexuose, with distant minute linear-subulate appressed leaves. Branches numerous, leafy, compressed, pinnately or flabellately decompound; branchlets forked, the ultimate ones $\frac{1}{2}$–3 in. long, $\frac{1}{6}$–$\frac{1}{4}$ in. broad including the leaves. Leaves dimorphous, the larger distichously spreading, $\frac{1}{8}$–$\frac{1}{6}$ in. long, with a broad adnate decurrent base, ascending, lanceolate, strongly falcate, acuminate, midrib evident, oblique, texture firm; smaller leaves much reduced in size, linear, appressed. Spikes very numerous, 1–4 in. long, $\frac{1}{12}$ in. broad, cylindrical, pendulous, arranged in large terminal much-branched panicles 6–24 in. long. Bracts imbricating, small, not much longer than the sporangia, broadly ovate or almost orbicular, suddenly narrowed into an erect subulate point.—*A. Cunn. Precur.* (1836) n. 158; *Raoul Choix* (1846) 37; *Hook. and Grev. Ic. Fil.* (1829) t. 170; *Hook. f. Fl. Nov. Zel.* ii (1855) 55; *Handb. N.Z. Fl.* (1864) 391; *Benth. Fl. Austral.* vii (1878) 677; *Bak. Fern Allies* (1887) 29; *Thoms. N.Z. Ferns* (1882) 107; *Cheesem. Man. N.Z. Fl.* (1906) 1040. L. D'Urvillei *A. Rich. Fl. Nouv. Zel.* (1832) 60 (*not of Bory*).

Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Abundant throughout, usually forming entangled masses among low scrub. Sea-level to 3000 ft. *Waewaekoukou.*

By far the most beautiful species of the genus. It extends to Polynesia, New Caledonia, North Australia, the mountains of New Guinea, Java, Borneo, and the Malay Peninsula.

3. **TMESIPTERIS** Bernh.

Rhizome long, creeping, much branched; true roots wanting. Stems simple or rarely forked, pendulous or ascending, leafy. Leaves vertically placed, of two kinds: the foliage-leaves sessile and decurrent, simple and entire; the fertile leaves or sporophylls mixed with the foliage-leaves and about the same size, shortly petiolate, bipartite. Sporangia (or synangia) attached to the petiole of the fertile leaf just below the lobes, boat-shaped or spindle-shaped, coriaceous, pointed at both ends, slightly constricted about the middle, 2-celled with the septum across the narrow diameter, dehiscing longitudinally; rarely the sporangia are 3-celled or 1-celled. Spores minute, oblong.

A genus consisting of one highly variable species, found in New Zealand, Australia and Tasmania, and some of the Pacific islands. By some authors it is split up into 3 or 4, distinguished mainly by the shape of the apex of the leaf (which I find to be variable even in the same individual) and by certain histological details, the constancy of which has yet to be established.

1. **T. tannensis** *Bernh. in Schrad. Journ. Bot.* ii (1800) 131, t. 2.—Stems 4–18 in. long or more, simple or rarely once or twice forked, usually pendulous, slender, naked towards the base. Foliage-leaves rather closely placed, $\frac{1}{3}$–1 in. long, obliquely oblong or oblong-lanceolate, sessile and strongly decurrent at the base, obtuse or truncate or acute at the tip, the

midrib usually produced into a mucro of variable length, coriaceous, dark dull-green. Fertile leaves rather shorter than the foliage-leaves and replacing them at intervals down the stem, on short petioles sometimes $\frac{1}{4}$ in. long, deeply 2-partite, the divisions usually similar to the foliage-leaves but smaller. Synangia sessile or very shortly stalked, $\frac{1}{6}$–$\frac{1}{4}$ in. long, parallel to the petiole, brown, coriaceous.—*Benth. Fl. Austral.* vii (1878) 680; *Bak. Fern Allies* (1887) 30; *Cheesem. Man. N.Z. Fl.* (1906) 1041. T. Forsteri *Endl. Prodr. Fl. Norfolk.* (1833) 6; *A. Cunn. Precur.* (1836) n. 151; *Raoul Choix* (1846) 37; *Hook. f. Fl. Nov. Zel.* ii (1855) 51; *Handb. N.Z. Fl.* (1864) 391; *Thoms. N.Z. Ferns* (1882) 108. T. truncata *Desv. in Ann. Soc. Linn. Par.* vi, 192; *Hook. Gen. Fil.* (1842) t. 86.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND, AUCKLAND ISLANDS: Common in forests throughout, particularly on the western sides of the islands, usually epiphytic on the stems of tree-ferns, more rarely on rocks. Sea-level to 3000 ft.

For a discussion on the morphology and systematic position of this plant see Professor Bower's memoir "On the Morphology of the Spore-producing Members" (Trans. Roy. Soc. 1894, p. 541–48) and the more recently published paper by Professor Thomas entitled "The Affinity of *Tmesipteris* with the *Sphenophyllales*" (Proc. Roy. Soc. vol. lxix, p. 343–50). Reference should also be made to Mr. Holloway's paper on "The Prothallus and Young Plant of *Tmesipteris*" (Trans. N.Z. Inst. vol. 1 (1918) 1.)

4. **PSILOTUM** Swartz.

Rhizome short, creeping, branched; true roots wanting. Stem erect or pendulous, simple below, repeatedly dichotomously branched above; branches angled or flat. Leaves very minute, scale-like, laxly placed, trifarious or distichous. Sporangia (or synangia), coriaceous, almost globular, usually 3-lobed and 3-celled, rarely 2- or 4-celled, in the axil or attached below the fork of a minute bifid scale-like fertile leaf or sporophyll, which is either sessile or raised on a short petiole. Spores minute, oblong, curved.

A small genus of two species, widely distributed in the tropical and subtropical regions of both hemispheres. The New Zealand species has the range of the genus.

1. **P. triquetrum** *Swartz Syn. Fil.* (1806) 117.—Stems 4–18 in. long, erect or pendulous when growing on trees, stout or slender, simple below, many times dichotomously branched in the upper part; branchlets triquetrous, the ultimate ones $\frac{1}{35}$–$\frac{1}{20}$ in. diam. Leaves placed on the angles of the stems and branches, distant, minute, scale-like, ovate-subulate, $\frac{1}{12}$–$\frac{1}{8}$ in. long. Fertile leaves bifid, rather smaller than the foliage-leaves, sessile or shortly petiolate. Synangia $\frac{1}{10}$–$\frac{1}{15}$ in. diam., globose or broader than long.—*Hook. Gen. Fil.* (1843) t. 87; *Fil. Exot.* (1857–59) t. 63; *Hook. f. Fl. Nov. Zel.* ii (1855) 56; *Handb. N.Z. Fl.* (1864) 391; *Benth. Fl. Austral.* vii (1878) 681; *Bak. Fern Allies* (1887) 30; *Thoms. N.Z. Ferns* (1882) 108; *Cheesem. Man. N.Z. Fl.* (1906) 1041. P. heterocarpum *Col. in Trans. N.Z. Inst.* xx (1888) 237.

KERMADEC ISLANDS: Not uncommon, *T. F. C.*, *W. R. B. Oliver!* NORTH ISLAND: Rangaunu Harbour, *R. H. Matthews!* Rangitoto Island, *Colenso!* and many others; Auckland Isthmus, very rare, *T. F. C.;* Motuhora Island (Bay of Plenty), *Joliffe;* near Maketu, *T. Kirk;* soil heated by hot springs at Orakeikorako, *T. Kirk!* Wairakei, *C. J. Norton!* and Tokaanu, *T. F. C.;* Karangahake Cliffs, Taupo, *H. Hill!* Sea-level to 1800 ft.

In all tropical and subtropical regions as far north as Japan and Florida.

Family V. **ISOETACEAE.**

Aquatic or amphibious perennials, often entirely submerged, rarely terrestrial. Stem (corm) short and tuberous, of firm texture, 2–3-lobed; roots numerous, rather fleshy, dichotomously forked, springing from the furrows of the stem. Leaves many, forming a dense tuft at the top of the stem, linear or filiform, flat in front, rounded at the back, dilated and sheathing at the base, always furnished with 4 longitudinal air-channels divided by transverse partitions, and with a single central vascular bundle; stomata present, or absent in those species which are permanently submerged. Sporangia large, membranous, placed in a hollow (fovea) of the dilated base of the leaf and sometimes partly concealed by the membranous margin (velum or indusium) of the fovea, 1-celled, but often imperfectly divided by rods or plates of tissue (trabeculae), those of the outer leaves containing macrospores, those of the inner leaves microspores. Immediately above the fovea is a flattened membranous plate called the ligule. Macrospores large, globose, usually chalky-white, with three ribs radiating from the apex. Microspores very minute, trigonous.

A very isolated family, consisting of the single genus *Isoetes*, allied on the one hand to the Lycopods and on the other to ferns. In germination a male prothallium with a single antheridium containing spermatozoids is developed within the microspore, the spermatozoids being set free by the bursting of the coats of the microspores. The macrospores in a similar manner each produce a female prothallium bearing 2 or 3 archegonia, which are ultimately exposed by the splitting of the macrospore along the three ridges. Fertilization then takes place in the same way as in ferns.

1. **ISOETES** Linn.

Characters of the order.

Widely distributed in most temperate and tropical regions. Over 60 species are admitted in the most recent enumeration, but many of them are very imperfectly known. The two found in New Zealand are endemic.

Macrospores tubercled .. .. 1. *I. Kirkii.*
Macrospores smooth .. .. 2. *I. alpinus.*

1. **I. Kirkii** *A. Braun in Berl. Monatber., July*, 1869.—Permanently submerged. Stem short, tuberous, deeply 3-lobed; roots numerous. Leaves 10–30, very slender, 3–12 in. long, about $\frac{1}{20}$ in. diam., tapering to a fine point, pale-green, diaphanous, usually with a few stomata, but with no accessory bast-bundles. Sporangia rather small, broadly oblong or almost globose, about $\frac{1}{8}$ in. long; indusium complete. Macrospores rather small, chalky-white, beset all over with small unequal tubercles. Microspores very minute, trigonous, most minutely punctate.—*T. Kirk in Trans. N.Z. Inst.* ii (1870) 107, t. 7; *Bak. Fern Allies* (1887) 127; *Thoms. N.Z. Ferns* (1882) 109; *Cheesem. Man. N.Z. Fl.* (1906) 1043.

North Island: Wairua River, *A. Thompson!* lakes in the Middle Waikato basin, abundant, *T. Kirk! T. F. C.;* Lake Rotokakahi, *T. Kirk!* Lake Taupo, *C. J. Norton!* South Island: Small lakes near Lake Tekapo, *T. F. C.* Sea-level to 2500 ft.

Best distinguished from the following species by its smaller size and more slender habit, fewer leaves, and particularly by the conspicuously tubercled macrospores.

2. **I. alpinus** *T. Kirk in Trans. N.Z. Inst.* vii (1875) 377, t. 25.—Permanently submerged; much larger and stouter than *I. Kirkii*. Stem stout, deeply 3-lobed. Leaves very numerous, 30–70, 6–18 in. long or even

more, $\frac{1}{15}$–$\frac{1}{10}$ in. broad at the middle, much dilated at the base, gradually tapering to the apex, dark-green, diaphanous, usually with a few stomata, but with no accessory bast-bundles. Sporangia oblong, $\frac{1}{6}$–$\frac{1}{5}$ in. long; indusium complete. Macrospores greyish-white, smooth or very indistinctly tubercled.—*Bak. Fern Allies* (1887) 127; *Thoms. N.Z. Ferns* (1882) 109; *Cheesem. Man. N.Z. Fl.* (1906) 1043. (?) I. multiangularis *Col. in Trans. N.Z. Inst.* xxii (1890) 449.

North Island: Lake Taupo, *C. J. Norton.* South Island: Not uncommon in lakes in mountain districts, from Nelson to the south of Otago. 1200–3000 ft.

Family VI. **PINACEAE.**

Resinous trees or shrubs, mostly evergreen, and always so in the New Zealand species. Leaves opposite or whorled or alternate, solitary or fascicled within membranous sheaths, usually narrow-linear or scale-like, rarely broad and flat (as in *Agathis*). Flowers mostly monoecious; perianth wanting in both sexes. Male flowers a cone or catkin of stamens placed on a central axis, each stamen in the axil of a scale. Anther-cells 2 or more, variously dehiscent. Female flowers consisting of ovules borne singly or several together on the surface of a scale which is usually placed in the axil of a bract. Fruit a cone with few or many woody or fleshy scales, sometimes berry-like. Seeds with or without a wing. Cotyledons two or many.

A large and important family, almost world-wide in its distribution, but most abundant in the temperate part of the Northern Hemisphere; rare in the tropics, except on high mountains; fairly well represented in the South Temperate Zone. Genera 31; species about 280. Many of the species yield valuable timber. Pines, firs, larches, cedars, cypresses in the Northern Hemisphere; the kauri, *Araucaria*, *Libocedrus*, &c., in the Southern, are well-known timber-trees of great economic and commercial value. The resinous products of the family are also of considerable importance. The most valuable are tar, turpentine, pitch, and kauri-gum. Of the two genera found in New Zealand, *Agathis* extends to Polynesia, Australia, and Malaya; while *Libocedrus* stretches as far north as Japan and California.

Leaves large, flat, oblong. Cones large, 2–3 in. diam.; scales and seeds many	1. Agathis.
Leaves small, scale-like. Cones small; scales 4–6; seeds 2–4 ..	2. Libocedrus.

ARAUCARIACEAE

See Trans. Linn. Soc. 8: 1807.

1. **AGATHIS** Salisb.

Evergreen monoecious or dioecious trees, often of great size. Leaves subopposite or alternate, broad, flat, coriaceous; nerves parallel. Male flowers solitary, axillary, peduncled; peduncle furnished with imbricate scales at the top. Anthers densely spirally arranged on a cylindrical column; cells 5–15, pendulous from the top of a rigid stipes. Female cones terminating short branchlets, broadly ovoid or globose; scales densely spirally arranged, tips broad. Ovules solitary or rarely 2 at the base of each scale and adnate to it, reversed. Mature cone globose or nearly so; scales closely imbricating and appressed, broad, flattened, hard but scarcely woody. Seeds 1 to each scale, very rarely 2, reversed, compressed, ovate or oblong; testa thin, produced into a membranous wing; albumen fleshy; cotyledons 2.

The genus *Agathis* contains seven or eight well-defined species, ranging from the Philippine Islands and Borneo to north-east Australia, western Polynesia, and New Zealand. Its present centre of distribution is evidently Polynesian, for there are 2 or possibly 3 species in New Caledonia, 1 in the New Hebrides, 1 in the Santa Cruz Group, and 1 in the Fiji Islands. It is somewhat remarkable that no species has yet been recorded from New Guinea or the Solomon Islands, but future explorations may remove this apparent anomaly. The single New Zealand species is purely endemic, although stated by Parlatore (D.C. Prodr. xvi, 2, 376) and Eichler (Naturl. Pflanzenf. ii, 1 abt. 67) to occur in Australia.

Students interested in the phylogeny, distribution, and morphology of *Agathis* and its close relative *Araucaria* should consult Seward and Ford's "Araucarieae, Recent and Extinct" (Trans. Roy. Soc. B. vol. 198 (1906) pp. 305–411).

1. **A. australis** *Salisb. in Trans. Linn. Soc.* viii (1807) 312.—A lofty forest-tree, with a straight columnar trunk and rounded somewhat bushy head, highly resiniferous in all its parts, usually ranging from 80–100 ft. high, with a trunk 4–10 ft. diam., but attaining an extreme height of 200 ft., with a trunk 15–22 ft. diam.; bark glaucous-grey, deciduous, falling off in large flat flakes. Leaves subopposite or alternate, sessile, very thick and coriaceous; of young trees lanceolate, 2–4 in. long, $\frac{1}{4}$–$\frac{1}{2}$ in. broad, gradually passing into those of mature trees, which are $\frac{3}{4}$–$1\frac{1}{2}$ in. long, linear-oblong or narrow obovate-oblong, obtuse. Flowers monoecious; males $\frac{3}{4}$–$1\frac{1}{2}$ in. long, cylindrical. Female cones obovoid in the flowering stage, becoming almost spherical when ripe, erect, 2–3 in. diam.; scales broad, flat, rather thin, falling away from the axis at maturity. Seeds 1 to each scale, ovate, compressed, winged.—*T. Kirk Forest Fl.* (1889) tt. 79–81; *Cheesem. Man. N.Z. Fl.* (1906) 645; *Ill. N.Z. Fl.* ii (1914) t. 184; *Cockayne Veg. N.Z.* (1921) tt. 30, 33. Dammara australis *Lamb. Pin.* ed. 2 (1828) 73; *A. Cunn. Precur.* (1838) n. 325; *Raoul Choix* (1846) 41; *Hook. f. Fl. Nov. Zel.* i (1853) 231; *Handb. N.Z. Fl.* (1864) 256. Podocarpus zamiaefolius *A. Rich. Fl. Nouv. Zel.* (1832) 360.

North Island: In forests from the North Cape southwards, attaining its extreme limit on the east coast inland from Maketu, in the Bay of Plenty; on the western side of the island in the vicinity of Kawhia Harbour. Sea-level to 2000 ft. *Kauri*, of the resin *kapia*.

The kauri-pine has given rise to an extensive literature. The first reliable popular account is that of Hochstetter ("New Zealand," pp. 140–50). For more strictly scientific information reference should be made to Mr. Kirk's "Forest Flora," and to Dr. Cockayne's "Botanical Survey of the Waipoua Kauri Forest." In my "Age and Growth of the Kauri" (Trans. N.Z. Inst. xlvi (1914) pp. 9–19) I have endeavoured to dispel the erroneous ideas entertained by previous writers as to the supposed slow rate of growth of the kauri; and in the "Illustrations of the New Zealand Flora," published in 1914, I have given a compendium of its history, and an account of its physiognomy and economic value. Lastly, Sir David Hutchins's recent publications on New Zealand forestry fully and clearly show the position of the kauri-pine as a timber-tree, and its suitability for planting in the future State forests of New Zealand.

2. **LIBOCEDRUS** Endl.

CUPRESSACEAE Syn. Con. 1907-52

Usually tall trees. Leaves opposite, small and scale-like, quadrifariously imbricate, either all equal and decussate or flattened on the branchlets, the lateral larger and keeled, those on the upper and lower faces of the branchlets smaller and flat. Flowers monoecious or dioecious; males terminal, solitary, oblong or ovoid or almost globose, consisting of a staminal column sessile within the uppermost leaves and bearing several or many decussately placed anthers; connective scale-like, ovate, subpeltate; anther-

cells usually 4, pendulous. Female cones oblong or ovoid, terminating short branchlets; scales 4 or 6, decussately opposite, the lowest pair smallest and sterile, the second pair with 2 erect collateral ovules at the base of each scale, the third pair when present sterile and connate. Scales of the mature cones persistent, gaping, indurated, mucronate or horned at the back towards the tip. Seeds solitary or rarely 2 at the base of each fertile scale, compressed, unequally winged.

A small genus of 9 species, with a very singular distribution, 1 being found in California, 2 in Chile, 2 in New Zealand, and 1 each in New Caledonia, New Guinea, China, and Japan.

Branchlets of mature trees more or less compressed, not tetragonous.
Cones ½ in. long .. .. 1. *L. Doniana.*

Branchlets of mature trees always tetragonous. Cones ¼–⅓ in. long .. 2. *L. Bidwillii.*

also

1. **L. Doniana** *Endl. Syn. Conif.* (1847) 43.—A tall forest-tree 30–70 ft. high or more, with a narrow tapering head; trunk 2–4 ft. diam.; bark stringy, falling off in long ribbons. Branchlets distichous; of young trees vertical, much flattened and compressed, $\frac{1}{5}$–$\frac{1}{4}$ in. broad; of old trees horizontal, less compressed, but not obviously tetragonous, $\frac{1}{10}$–$\frac{1}{8}$ in. broad. Leaves quadrifarious, the lateral larger, especially on young trees, where they are often ⅕ in. long, sheathing and connate at the base, spreading, acute; those on the upper and lower faces of the branchlets $\frac{1}{25}$–$\frac{1}{12}$ in. long, triangular, appressed to the branch. Male flowers about ¼ in. long, hardly broader than the branch; anthers 8–12; connective thin, ovate, subpeltate. Female cones ovoid, about ½ in. long, woody; scales 4, spreading, each with a sharp curved spine at the back. Seeds 2 to each cone.—*Hook. f. Handb. N.Z. Fl.* (1864) 256; *T. Kirk Forest Fl.* (1889) t. 82; *Cheesem. Man. N.Z. Fl.* (1906) 646. Thuja Doniana *Hook. in Lond. Journ. Bot.* i (1842) 571; *Hook. f. Fl. Nov. Zel.* i (1853) 231. Dacrydium plumosum *D. Don in Lamb. Pin.* ed ii, App. 143; *A. Cunn. Precur.* (1836) n. 330.

North Island: In forests from Mangonui southwards to Hawke's Bay and Taranaki, but often rare and local. South Island: Between Collingwood and West Wanganui, *H. J. Matthews* ex *Cockayne.* Sea-level to 2000 ft. *Kawaka; New Zealand Arbor-vitae.*

Wood dark-red, beautifully grained, said to be durable, but on account of its scarcity little used. Very young seedlings have narrow linear-subulate leaves spreading on all sides, but these soon pass into the quadrifarious stage.

2. **L. Bidwillii** *Hook. f. Handb. N.Z. Fl.* 257.—Very similar to *L. Doniana*, but usually smaller, seldom more than 50 ft. high, with a trunk 1½–3 ft. diam., in subalpine or cool peaty localities often reduced to a fastigiate bush or small tree 10–20 ft. high. Branchlets of young trees closely resembling those of *L. Doniana*, but rather narrower; of mature trees tetragonous, $\frac{1}{15}$–$\frac{1}{12}$ in. diam., densely clothed with almost uniform triangular acute closely appressed leaves. Female cones like those of *L. Doniana*, but smaller, ¼–⅓ in. long.—*T. Kirk Forest Fl.* (1889) t. 83; *Cheesem. Man. N.Z. Fl.* (1906) 647.

North and South Islands: From Te Aroha Mountain and Mount Egmont southwards to Foveaux Strait, not uncommon in hilly or mountain forests. 800–4000 ft. *Pahautea; Cedar.*

Often confounded with the previous species, but the obviously tetragonous branchlets of the mature tree, with almost uniform leaves, are characteristic and readily distinguish it. Wood soft, red, straight in the grain, easily split, and apparently of great durability, but of low specific gravity and somewhat brittle.

Family VII. **TAXACEAE.** PODOCARPACEAE

Trees or shrubs, usually resinous, mostly evergreen, and always so in the New Zealand species. Leaves linear or scale-like, or in some exotic genera broad and fan-like; in *Phyllocladus* replaced by broad flattened branchlets which are toothed or lobed. Flowers usually dioecious; perianth wanting in both sexes. Male flowers a small cone or catkin of stamens placed on a central axis, each stamen in the axil of a scale. Anther-cells usually two. Female flowers consisting of one or few ovules borne on the upper face of a scale, axillary or terminal, not associated into a cone. Fruit nut-like, often with an aril at the base, or the axis below the ovule with the scales upon it often becoming coloured and succulent when the fruit is ripe.

A well-known family, comprising 10 genera and 100 species. It is more plentiful in the Southern Hemisphere than in the Northern, although the common yew (*Taxus baccata*) and a few other species are found therein. The three genera native to New Zealand have a wide geographical range, and contain several important timber-trees.

Leaves small, linear and flat or scale-like. Peduncle of fruit, together with the bracts, usually fleshy and enlarged. Ovule reversed	1. PODOCARPUS.
Leaves usually dimorphic, of mature trees small and scale-like. Peduncle of fruit dry or fleshy. Ovule at first reversed but ultimately erect. Seed seated in a membranous or fleshy aril ..	2. DACRYDIUM.
Branchlets expanded into broad and flat coriaceous leaf-like cladodes. True leaves reduced to minute scales. Ovule erect ..	3. PHYLLOCLADUS.

1. **PODOCARPUS** L'Herit. L.Hér. Sert. Syncp. 350.

Trees or shrubs. Leaves alternate or opposite, scattered or imbricate or distichous, very diverse in size and shape. Flowers dioecious or rarely monoecious; males solitary or in fascicles of 2–5, or laxly spicate along an elongated rhachis, usually stipitate, the stipes furnished with imbricate bracts. Staminal column elongate, cylindric; anthers sessile, densely spirally crowded; cells 2, parallel, dehiscing longitudinally; connective usually prolonged into a short claw. Female flowers solitary or occasionally geminate, very rarely spicate; bracts or scales few, adnate with the rhachis into a swollen fleshy or succulent peduncle or "receptacle"; ovuliferous scale springing from the receptacle, ovoid, fleshy, bearing a single reversed ovule. Seeds globose or ovoid, seated on the enlarged receptacle, drupaceous or nut-like. Cotyledons 2.

About 60 species are known, scattered through the tropical and subtropical regions of the Old World, from Japan and China southwards to New Zealand and South Africa, also in most parts of South America; wanting in Europe, North America, North Africa, and western Asia. The New Zealand species are all endemic.

A. Flowers axillary.

* Male flowers solitary or 2–4 at the tip of a common peduncle.

Tree 40–100 ft.; bark thick. Leaves ½–1 in., linear, rigid and coriaceous, pungent. Male flowers subsessile. Nut small, obtuse	1. *P. totara.*
Tree 25–60 ft.; bark thin, papery. Leaves ¾–1½ in., linear, rigid and coriaceous, pungent. Male flowers evidently stalked. Nut acute	2. *P. Hallii.*
Erect shrub 3–10 ft.; branches slender. Leaves lax, ½–1 in. long, narrow-linear, pungent, thin	3. *P. acutifolius.*
Diffuse or prostrate shrub 2–8 ft.; branches stout. Leaves close-set, ¼–⅔ in., linear-oblong, obtuse, thick and coriaceous	4. *P. nivalis.*

Tree 50–80 ft. Leaves distichous, $\frac{1}{2}$–$\frac{3}{4}$ in., linear, acute, falcate. Fruit large, broadly oblong, succulent, $\frac{3}{4}$ in. long .. .. 5. *P. ferrugineus.*

** Male flowers numerous, spiked.

Tree 40–80 ft. Leaves distichous, $\frac{1}{3}$–$\frac{1}{2}$ in., linear, obtuse. Fruit globose, succulent, $\frac{1}{4}$–$\frac{1}{3}$ in. diam. .. .. 6. *P. spicatus.*

B. Flowers terminating the branchlets.

Tree 80–120 ft. Leaves of young trees distichous, $\frac{1}{4}$ in.; of mature plants imbricate all round, $\frac{1}{12}$–$\frac{1}{8}$ in., subulate-lanceolate, acuminate 7. *P. dacrydioides.*

1. **P. totara** *D. Don in Lamb. Pin.* ed. ii (1832) 189.—A lofty forest-tree 40–80 ft. or even 100 ft. high; trunk 2–6 ft. diam.; bark thick, furrowed, stringy and papery, capable of removal in large sheets. Leaves dull brownish-green, spreading on all sides or obscurely distichous, $\frac{1}{2}$–1 in. long, linear, straight or slightly falcate, acute, pungent, rigid and coriaceous, midrib obscure. Flowers dioecious. Males $\frac{1}{2}$–$\frac{3}{4}$ in. long, stout, obtuse, axillary, solitary or 2–3 together at the top of a very short stout peduncle or almost sessile; each flower with 4 bracts at the base. Anthers numerous, crowded; connective toothed at the tip. Female flowers axillary, solitary or geminate at the top of a short swollen peduncle. Fruit ovoid-oblong, rounded at the tip; peduncle usually much enlarged, red, succulent; but occasionally dry and shrivelled.—*A. Cunn. Precur.* (1836) n. 328; *Raoul Choix* (1846) 41; *Hook. Lond. Journ. Bot.* i (1842) 572, t. 19; *Hook. f. Fl. Nov. Zel.* i (1853) 233; *Handb. N.Z. Fl.* (1864) 258; *T. Kirk Forest Fl.* (1889) t. 115; *Pilger in Pflanzenr.* iv, 5 (1903) 84; *Cheesem. Man. N.Z. Fl.* (1906) 648; *Ill. N.Z. Fl.* ii (1914) t. 185; *Cockayne Veg. N.Z.* (1921) t. 28. P. Bidwillii *Hoibrenk in Endl. Con.* (1847) 213. P. Cunninghamii *Col. Visit to Ruahine Range* (1844) 58.

North and South Islands: Common in forests from the North Cape to the south-east of Otago. Sea-level to 2000 ft. *Totara.*

A magnificent tree, scarcely less valuable than the kauri; but, unlike it, generally distributed throughout the colony. Wood red, straight-grained, compact, extremely durable, much used for all kinds of building purposes and constructive works. From its power of resisting the attacks of the teredo it is particularly valuable for the piles of wharves, &c. The huge war-canoes of the Maoris, which were often over 80 ft. in length, were carved from the trunks of totara-trees, and it was also the favourite timber for their carved houses.

2. **P. Hallii** *T. Kirk Forest Fl.* (1889) t. 9, 9A.—Very closely allied to *P. totara*, and perhaps a mere variety, but smaller, 25–60 ft. high; trunk rarely exceeding 3 ft. diam.; bark thin, papery; branches of young trees weak, slender. Leaves of young plants usually distichous, spreading, 1–1$\frac{1}{2}$ in. long, narrow linear-lanceolate; of mature trees inserted all round the branches, close-set, $\frac{3}{4}$–1 in. long, linear or linear-lanceolate, acute, pungent, rigid and coriaceous, midrib somewhat prominent beneath. Flowers dioecious. Male flowers as in *P. totara*, but usually solitary and distinctly peduncled. Female flowers frequently geminate on the short peduncle. Fruit narrow-ovoid, pointed; peduncle usually enlarged and succulent.—*Cheesem. Man. N.Z. Fl.* (1906) 648. P. totara *var.* Hallii *Pilger in Pflanzenr.* iv, 5 (1903) 84.

North and South Islands, Stewart Island: In forests from Kaitaia and Mangonui southwards, not uncommon. Sea-level to 3500 ft.

I am very doubtful as to this being more than a variety of *P. totara*, which is the view held by Dr. Pilger. Young plants are easily distinguished by the weak and often flexuous branches and larger leaves; but it must be confessed that the mature

foliage so closely resembles that of *P. totara* that it is often difficult to separate the two plants by that character alone. The thin papery bark is, however, unmistakable. I fear that the shape of the fruit and the length of the peduncle of the male flower are subject to variation. The wood is similar to that of *P. totara*, but is said to be inferior in durability. Mr. Kirk suggests that Colenso's *P. Cunninghamii* may be identical with *P. Hallii;* but the type specimen in Mr. Colenso's herbarium appears to be *P. totara.*

3. **P. acutifolius** *T. Kirk in Trans. N.Z. Inst.* xvi (1884) 370, t. 26.—An erect much-branched shrub 5–30 ft. high; branches slender, erect. Leaves usually rather lax, spreading $\frac{1}{3}$–1 in. long, linear, straight, acuminate and pungent, sessile or nearly so, green, coriaceous; midrib indistinct; margins slightly recurved. Flowers dioecious. Males $\frac{1}{3}$–$\frac{1}{2}$ in. long, solitary or in fascicles of 2–4 at the top of an erect peduncle about $\frac{1}{2}$ in. long, each flower with 4 scarious acuminate bracts at its base, forming a quasi-involucre at the top of the peduncle. Anthers numerous, closely packed; connective obtuse. Female flowers minute, axillary, solitary or very rarely geminate at the top of a short swollen peduncle. Fruit small, ovoid, seated on the enlarged and fleshy bright-red peduncle.—*T. Kirk Forest Fl.* (1889) t. 39; *Pilger in Pflanzenr.* iv, 5 (1903) 84; *Cheesem. Man. N.Z. Fl.* (1906) 649.

South Island: Marlborough—*J. Rutland!* Mount Duppa, *J. H. Macmahon!* Nelson—Lake Rotoiti and upper part of the Buller Valley, *T. Kirk! T. F. C.;* Hope Valley, *T. F. C.* Westland—Lake Brunner and Franz Josef Glacier, and common southwards to the Cook River, *Cockayne!*

Allied to *P. nivalis,* but at once recognized by the erect slender habit and narrow pungent leaves. From *P. totara* it is separated by the small size, much more slender habit, and narrower thinner leaves.

4. **P. nivalis** *Hook. Ic. Plant.* (1843) t. 582.—A much-branched erect or prostrate shrub 2–8 ft. high; branches wide-spreading, often rooting at the base. Leaves close-set, sessile, not distichous, spreading or recurved, $\frac{1}{3}$–$\frac{2}{3}$ in. long, linear to linear-oblong or narrow linear-obovate, obtuse, apiculate, narrowed to the base, very thick and coriaceous, midrib prominent beneath, margins thickened. Flowers dioecious. Males axillary, solitary or 2–4 at the top of a slender peduncle, variable in length, very slender, $\frac{1}{4}$–1 in. long. Anthers very numerous, often laxly placed; connective obtuse. Female flowers solitary, axillary, seated on the top of a short swollen peduncle. Fruit a small oblong-ovoid nut; peduncle much enlarged, fleshy and succulent, bright-red, usually with 2 acute projections at the top (adnate bracts), 1 on each side of the nut.—*Raoul Choix* (1846) 41; *Hook. f. Fl. Nov. Zel.* i (1853) 232; *Handb. N.Z. Fl.* (1864) 257; *T. Kirk Forest Fl.* (1889) t. 40; *Pilger in Pflanzenr.* iv, 5 (1903) 85; *Cheesem. Man. N.Z. Fl.* (1906) 649; *Ill. N.Z. Fl.* (1914) t. 186. P. montanus *Col. in Trans. N.Z. Inst.* xxvii (1895) 395.

Var. **erectus** *Cockayne in Trans. N.Z. Inst.* xlviii (1916) 199.—Erect, 4–7 ft. high, not prostrate. Leaves larger, sometimes nearly 1 in. in length.

North and South Islands: Abundant in subalpine localities from the summit of Moehau (Cape Colville) and Tongariro southwards to Foveaux Strait. Usually from 2000 to 5500 ft., but descends almost to sea-level near Okarito and elsewhere in Westland. Var. *erectus:* Nelson—Mount Owen and Mount Percival, 3000 ft., *T. F. C.* Canterbury—Cass River, *Cockayne.*

A distinct little plant. Mr. Kirk has well pointed out that it is serviceable from its spreading and rooting habit, which helps to bind the loose surface of steep mountain-slopes.

5. **P. ferrugineus** *D. Don in Lamb. Gen. Pinet.* ed. ii (1832) 189.—A tall forest-tree 50–80 ft. high with a rather narrow round-topped head; trunk 1–3 ft. diam.; bark greyish-brown or almost black, scaling off in large flakes. Leaves distichous, close-set, spreading, $\frac{1}{2}$–$\frac{3}{4}$ in. long, linear, falcate, acute or subacute, 1-nerved, margins recurved, red-brown when dry; those of young plants longer, narrower, and more acute. Flowers dioecious. Males axillary, solitary, sessile, cylindric, equalling or rather longer than the leaves. Anthers numerous, closely packed; connective obtuse. Female flowers solitary or very rarely geminate at the top of a curved peduncle clothed with minute scale-like bracts. Fruit large, broadly oblong, drupaceous, $\frac{3}{4}$ in. long, reddish-purple with a glaucous bloom, top of the peduncle not enlarged nor succulent.—*A. Cunn. Precur.* (1836) n. 327; *Raoul Choix* (1846) 41; *Hook. Ic. Plant.* (1843) t. 543; *Hook. f. Fl. Nov. Zel.* i (1853) 232; *Handb. N.Z. Fl.* (1864) 257; *T. Kirk Forest Fl.* (1889) t. 84; *Pilger in Pflanzenr.* iv, 5 (1903) 66; *Cheesem. Man. N.Z. Fl.* (1906) 650.

North and South Islands, Stewart Island: Abundant in forests throughout. Sea-level to 3000 ft. *Miro; Toromiro; Black-pine.*

Wood strong, hard and compact, straight-grained, not durable in exposed situations. The fleshy drupes form the chief food of the wood-pigeon during the winter months.

6. **P. spicatus** *R. Br. in Benn. Pl. Jav. Rar.* (1838) 40.—A tall round-headed forest-tree 40–80 ft. high; branches numerous, crowded, erect; trunk 2–4 ft. diam.; bark black or bluish-black, scaling off in large flakes. Young plants with long slender flexuous and pendulous branches, clothed towards the tips with reddish-brown leaves. Leaves of mature plants distichous, $\frac{1}{3}$–$\frac{1}{2}$ in. long, linear, straight or slightly falcate, obtuse or apiculate, coriaceous, green above, glaucous beneath. Flowers dioecious. Males numerous, $\frac{1}{5}$–$\frac{1}{3}$ in. long, linear, obtuse, horizontal, arranged in axillary spikes. Anthers closely packed; connective ovate, acute. Female flowers in 3–8-flowered spikes. Fruit black or nearly so, globose, succulent, $\frac{1}{4}$–$\frac{1}{3}$ in. diam.; fleshy receptacle wanting.—*Hook. Ic. Plant.* (1843) t. 543; *Raoul Choix* (1846) 41; *Hook. f. Fl. Nov. Zel.* i (1853) 232; *Handb. N.Z. Fl.* (1864) 258; *T. Kirk Forest Fl.* (1889) t. 4, 5; *Pilger in Pflanzenr.* iv, 5 (1903) 65; *Cheesem. Man. N.Z. Fl.* (1906) 650. P. matai *Lamb. ex Hook. f. Handb. N.Z. Fl.* (1864) 741. Dacrydium taxifolium *Banks and Soland. ex Lamb. Pin.* ed. 2 (1824) 119. D. Mai *A. Cunn. Precur.* (1836) n. 329. Prumnopitys spicata *Kent in Veitch Man. Con.* ed. 2 (1900) 157.

North and South Islands, Stewart Island: Not uncommon in forests from the North Cape southwards. Sea-level to 2000 ft. *Matai; Mai; Black-pine.*

A very distinct species, at once recognized by the spicate flowers and globose fruit. Wood brownish, hard, heavy, close-grained, of great strength and durability. This and the preceding differ from the remaining New Zealand species in wanting the succulent receptacle to the fruit.

7. **P. dacrydioides** *A. Rich. Fl. Nouv. Zel.* (1832) 358, t. 39.—A lofty tree 80–100 ft. or 120 ft. high, in swampy localities often growing gregariously and forming dense forests; trunk 2–5 ft. diam. Leaves of two forms: those of young trees distichous, $\frac{1}{6}$–$\frac{1}{4}$ in. long, linear, falcate, upturned and acuminate at the tip, decurrent at the base, flat, nerveless; of mature trees inserted all round the branch and appressed to it, imbricated, $\frac{1}{12}$–$\frac{1}{8}$ in. long, subulate-lanceolate, acuminate, keeled. Flowers dioecious. Males solitary, terminal, $\frac{1}{6}$–$\frac{1}{4}$ in. long; anthers crowded; connective ovate, acute. Female flowers minute, solitary, terminating the branchlets; peduncle and bracts

swollen. Fruit a black ovoid nut about $\frac{1}{6}$ in. long, seated on the greatly enlarged bright-red succulent peduncle.—*Raoul Choix* (1846) 41; *Hook. f. Fl. Nov. Zel.* i (1853) 233; *Handb. N.Z. Fl.* (1864) 258; *T. Kirk Forest Fl.* (1889) t. 31, 32; *Pilger in Pflanzenr.* iv, 5 (1903) 57; *Cheesem. Man. N.Z. Fl.* (1906) 651; *Cockayne Veg. N.Z.* (1921) t. 27. P. thuyoides *R. Br. in Benn. Pl. Jav. Rar.* (1838) 41. Dacrydium excelsum *A. Cunn. Precur.* (1838) n. 214. D. ferrugineum *Van Houtte ex Gord. Pin.* (1858) 590.

North and South Islands, Stewart Island: In lowland forests from the North Cape southwards, abundant. Sea-level to 2000 ft. *Kahikatea; Kahika; White-pine,*

The kahikatea, or white-pine, as it is usually called in the south of New Zealand, is probably the tallest tree in the Dominion. Two specimens measured by Sir David Hutchins in the forests of Westland had heights of 210 ft. and 184 ft. respectively, each having a diameter of about 5 ft. Another example noticed at Kakahi, a little to the south of Taumarunui, on measurement by Mr. Phillips Turner proved to be 195 ft. high. No doubt taller trees will yet be observed. The wood is white or pale-yellow, tough and compact, straight-grained and easily worked, but unfortunately not durable when in contact with the ground or where regularly exposed to damp. It is very suitable for inside work of all kinds, but is liable to the attacks of a small boring-beetle.

2. **DACRYDIUM** Soland.

Trees or shrubs. Leaves usually dimorphic; of old trees small and scale-like, closely imbricate; of young trees or of the lower branches of old ones longer and narrower, spreading, linear or linear-subulate. Flowers dioecious or more rarely monoecious. Males solitary at the tips of the branchlets and sessile amongst the uppermost leaves. Staminal column oblong or cylindrical; anthers sessile, spirally imbricate; cells 2, globose, contiguous, deflexed; connective prolonged into a terminal claw or spur. Female flowers at or near the tips of the branchlets, the bracts hardly differing from the foliage-leaves. Ovuliferous scale free, at length exceeding the bract; ovule solitary, at first more or less reversed, at length erect. Seeds ovoid, nut-like, seated within a membranous or fleshy cup-shaped aril. Cotyledons 2.

About 16 species are known, natives of the Malay Peninsula, Borneo, Australia and Tasmania, New Caledonia, New Zealand, and Chile. All the species found in New Zealand are endemic.

A. Leaves of young plants spreading, linear, flat, abruptly passing into the smaller mature scale-like leaves. Nuts 1–5 together.

Height 50–80 ft. Leaves of young trees 1–1½ in., shortly petiolate. Mature branchlets nearly terete. Nuts 1–5, usually 3–4 .. 1. *D. Kirkii.*

Height 15–30 ft. Leaves of young trees $\frac{1}{2}$–$\frac{3}{4}$ in., shortly petiolate. Mature branchlets tetragonous, stout. Nuts 1–2 .. .. 2. *D. biforme.*

Height 2–10 ft. Leaves of young trees $\frac{1}{4}$–$\frac{1}{3}$ in., sessile. Mature branchlets tetragonous. Nuts 1–2 .. .. .. 3. *D. Bidwillii.*

B. Leaves of very young plants spreading, linear, terete, passing by gradual transitions into the mature scale-like imbricating leaves. Nuts usually solitary.

Height 60–100 ft.; branchlets pendulous. Leaves of mature plants $\frac{1}{12}$–$\frac{1}{8}$ in., subulate, trigonous. Receptacle below the female flower often fleshy .. .. 4. *D. cupressinum.*

Height 20–40 ft.; branchlets not pendulous. Leaves of young trees (second stage) trigonous, not distichous. Mature branchlets $\frac{1}{12}$ in. diam.; leaves $\frac{1}{15}$–$\frac{1}{10}$ in. long, obtuse. Nuts solitary; aril short .. .. 5. *D. intermedium.*

Height 20–50 ft., branchlets not pendulous. Leaves of young trees (second stage) flat, triangular, decurrent, often distichous. Mature branchlets $\frac{1}{20}$–$\frac{1}{15}$ in. diam.; leaves $\frac{1}{20}$–$\frac{1}{12}$ in. long, subacute. Nuts often 2; aril large, sometimes reaching the middle of the nut .. .. 6. *D. Colensoi.*

Prostrate, 3–18 in. long; branches straggling. Leaves of mature plants either spreading, $\frac{1}{8}$–$\frac{1}{12}$ in. long, or imbricating, $\frac{1}{20}$–$\frac{1}{4}$ in... 7. *D. laxifolium.*

D. excelsum A. Rich. Fl. N.Z. 358 t 39. acc. to. P. excelsa A. Donin Lamb. Pin. Ed. ii, app. 1828. A. Cunn. as. Dacrydium Druce Rep. :640.

1. **D. Kirkii** *F. Muell. ex Parl. in D.C. Prodr.* xvi, ii (1868) 495.—A tall tree 50–80 ft. high; trunk 2–3 ft. diam.; bark greyish-brown; lower branches spreading, upper more erect. Leaves of two forms: those of young trees and on the lower branches of old ones large, erecto-patent, 1–1½ in. long, linear, subacute, narrowed into a very short twisted petiole, flat, pale-green, coriaceous; midrib distinct; margins slightly cartilaginous. Leaves of the upper and fertile branches small and scale-like, densely quadrifariously imbricate and appressed to the almost terete branchlets, $\frac{1}{12}$–$\frac{1}{8}$ in. long, ovate-rhomboid, obtuse, thick and coriaceous, obtusely keeled on the back; margins thin, membranous. Flowers dioecious. Males solitary, terminal, sessile, $\frac{1}{8}$–$\frac{1}{4}$ in. long. Females at the tips of the branchlets, forming a short oblong head $\frac{1}{4}$–$\frac{1}{2}$ in. long. Nuts 1–5 (usually 3–4), oblong, obtuse, compressed, striate, about $\frac{1}{8}$ in. long.—*Hook. f. Ic. Plant.* (1877) t. 1219; *T. Kirk in Trans. N.Z. Inst.* x (1878) 390, t. 19; *Forest Fl.* (1889) t. 97; *Pilger in Pflanzenr.* iv, 5 (1903) 46; *Cheesem. Man. N.Z. Fl.* (1906) 652.

North Island: In forests from Hokianga to the Manukau Harbour, rare and local. Whangaroa, *Hector* and *Buchanan!* between Hokianga and the Northern Wairoa, *Petrie! Cockayne;* between the Bay of Islands and Whangarei, *R. Mair! T. F. C.;* Great Barrier Island, *T. Kirk!* Titirangi (near Auckland), *T. F. C.* Sea-level to 2000 ft. *Monoao.*

A handsome tree, distinguished from its immediate allies by the large size, the large leaves of the young trees and lower branches of the old ones, the almost terete fertile branchlets, and the usually numerous nuts. The transition from the long linear leaves of the young state to the small scale-like leaves of the old plant is most abrupt, Both forms can often be found on the same branch. The wood is pale brownish-red. strong and compact, and exceedingly durable.

(Hook.)

2. **D. biforme** *Pilger in Pflanzenr.* iv, 5 (1903) 45.—A small tree 15–30 ft. or 40 ft. high, in alpine localities often dwarfed to a few feet; trunk short, 1–2 ft. diam.; bark dark-brown; branches stout, clothed with the persistent and indurated leaves; mature branchlets tetragonous. Leaves of two forms: those of young plants and on the lower branches of old ones spreading, $\frac{1}{3}$–$\frac{3}{4}$ in. long, $\frac{1}{15}$–$\frac{1}{12}$ in. broad, linear, acute, narrowed into a very short broad often twisted petiole, flat, coriaceous; midrib distinct. Leaves of old or fertile branchlets small and scale-like, densely quadrifariously imbricate and closely appressed, $\frac{1}{20}$–$\frac{1}{12}$ in. long, triangular or rhomboid-triangular, obtuse, very thick and coriaceous, stoutly and prominently keeled on the back. Flowers dioecious. Males solitary, terminal, sessile, about $\frac{1}{8}$ in. long; anthers 4–6; connective ovate, obtuse. Female flowers near the tips of the branchlets. Nuts 1–2 (usually solitary), oblong, obtuse, striate, compressed, about $\frac{1}{10}$ in. long.—*Cheesem. Man. N.Z. Fl.* (1906) 653. D. Colensoi *Hook. f. Fl. Nov. Zel.* i (1853) 234, *and Handb. N.Z. Fl.* (1864) 259 (*not of Hook. Ic. Plant.* t. 548); *T. Kirk in Trans. N.Z. Inst.* x (1878) 390; *Forest Fl.* (1889) t. 96. Podocarpus(?) biformis *Hook. Ic. Plant.* (1843) t. 544.

North Island: Mountain districts from Tongariro and the Ruahine Mountains southwards, not common. South Island, Stewart Island: Not uncommon in mountain forests throughout. Usually from 2000 to 4500 ft., but descends to sea-level in the south-west of Otago and on Stewart Island. *Yellow-pine; Tar-wood.*

This is for the most part the *D. Colensoi* of the Flora and the Handbook; but, as shown elsewhere, not the plant originally described under that name by Sir W. J. Hooker.

3. **D. Bidwillii** *Hook. f. ex T. Kirk in Trans. N.Z. Inst.* x (1878) 388.—A closely branched erect or prostrate shrub 2–10 ft. high; lower branches spreading, sometimes reclinate and rooting; upper more erect,

frequently giving a pyramidal form to the plant; trunk short, 3–9 in. diam. Leaves of two forms: those of young plants and on the lower branches of old ones spreading, crowded, $\frac{1}{4}$–$\frac{1}{3}$ in. long, linear, obtuse, sessile by a comparatively broad base, flat, coriaceous; midrib usually distinct. Leaves on the upper and fertile branches small and scale-like, densely quadrifariously appressed, $\frac{1}{25}$–$\frac{1}{12}$ in. long, triangular, obtuse, very thick and coriaceous. Flowers dioecious. Males solitary, terminal, sessile, $\frac{1}{10}$–$\frac{1}{8}$ in. long. Female flowers near the tips of the branchlets. Nuts 1 or 2, small, striate, compressed, obtuse, about $\frac{1}{12}$ in. long.—*T. Kirk Forest Fl.* (1889) t. 37; *Pilger in Pflanzenr.* iv, 5 (1903) 46; *Cheesem. Man. N.Z. Fl.* (1906) 653; *Ill. N.Z. Fl.* ii (1914) t. 187.

Var. *a*, **erecta** *T. Kirk.*—Main branches ascending or erect, giving the plant a pyramidal or almost fastigiate outline.

Var. *b*, **reclinata** *T. Kirk.*—Main branches prostrate or horizontal.

North Island: Summit of Moehau (Cape Colville), *Adams!* Tiroa (near Mangapeehi), *A. Wilson* and *J. C. Rolleston!* Tongariro and neighbouring mountains, *Spencer! T. F. C., Cockayne;* Lake Rotoaira, *Tryon!* Ruahine Mountains, *Colenso! B. C. Aston!* Kaimanawa Mountains, *B. C. Aston!* South Island, Stewart Island: Not uncommon in subalpine localities throughout. Usually from 2000 to 4500 ft., but descending to sea-level in Stewart Island.

A near ally of *D. biforme*, principally differing in the smaller size and remarkably distinct habit, in the smaller linear leaves, which are sessile by a broad base, and in the more slender branchlets and smaller nut. When seen growing it is distinguished without any difficulty, but dried specimens not showing the linear leaves are easily confounded with slender states of *D. biforme*.

also Rudr (1786) 92. n. 561.

4. **D. cupressinum** *Soland. ex Forst. f. Pl. Escul.* (1786) 80.—A tall forest-tree 60–80 ft. or even 100 ft. high, with a comparatively small round-topped head when mature, but pyramidal when young, with very long pale-green pendulous branches; trunk 2–5 ft. diam.; bark dark-brown, scaling off in large flakes. Leaves imbricating all round the branch; of young trees lax, ascending, $\frac{1}{6}$–$\frac{1}{4}$ in. long, linear-subulate, acute, almost acerose, decurrent at the base; gradually passing into those of the mature trees, which are much smaller and more closely set and more appressed to the branch, $\frac{1}{12}$–$\frac{1}{8}$ in. long, linear, acute, trigonous, keeled at the back. Flowers dioecious. Males solitary or rarely 2 together at the tips of the branchlets, oblong; connective broadly ovate, acuminate. Female flowers solitary on the curved tips of the branchlets. Nut ovoid, barely compressed, about $\frac{1}{8}$ in. long, seated within a cup-shaped aril; receptacle and bracts sometimes enlarged, fleshy and coloured, at other times remaining dry and unaltered.—*A. Rich. Fl. Nouv. Zel.* (1832) 361; *A. Cunn. Precur.* (1838) n. 332; *Raoul Choix* (1846) 41; *Hook. f. Fl. Nov. Zel.* i (1853) 233; *Handb. N.Z. Fl.* (1864) 258; *T. Kirk Forest Fl.* (1889) t. 18, 22; *Pilger in Pflanzenr.* iv, 5 (1903) 63; *Cheesem. Man. N.Z. Fl.* (1906) 654; *Cockayne Veg. N.Z.* (1921) t. 15. Thalamia cupressina *Spreng. Syst.* (1826) 890.

North and South Islands, Stewart Island: Abundant in forests throughout. Sea-level to 2500 ft. *Rimu; Red-pine.*

A well-known tree, the young state of which, with its graceful shape and pale-green pendent branches, is perhaps as beautiful and attractive as any tree in New Zealand. The wood is deep-red, strong, hard, and heavy, but often twisted in the grain. It is largely used for building purposes of all kinds and for the manufacture of furniture, but is not nearly as durable as either kauri or totara. In height *D. cupressinum* is but little inferior to the kauri or kahikatea. Two examples measured by Sir David Hutchins in the Westland forests reached heights of 198 ft. and 168 ft. respectively.

5. **D. intermedium** *T. Kirk in Trans. N.Z. Inst.* x (1878) 386, t. 20.—A small tree 20–40 ft. high or more; branches spreading; trunk 1–2 ft. diam., rarely more; bark brownish-grey. Leaves of very young plants lax, spreading, $\frac{1}{3}$–$\frac{1}{2}$ in. long, narrow linear-subulate, acute, curved, terete; gradually passing into the leaves of young trees, which are closer-set, squarrose or erecto-patent, $\frac{1}{8}$–$\frac{1}{4}$ in. long, broadly subulate, trigonous, acute. These again pass by imperceptible transitions into those of mature trees, which are densely quadrifariously imbricate and appressed to the branch, $\frac{1}{15}$–$\frac{1}{10}$ in. long, ovate-triangular or rhomboid, obtuse, keeled, very thick and coriaceous. Flowers dioecious or rarely monoecious. Males usually abundantly produced, solitary, terminal, sessile, about $\frac{1}{4}$ in. long; anthers numerous; connective broadly triangular, acute. Female flowers solitary at the tips of the branchlets. Nut oblong, obtuse or apiculate, faintly striate, not compressed, $\frac{1}{8}$–$\frac{1}{6}$ in. long, enclosed at the base in a short cup-shaped aril.—*T. Kirk Forest Fl.* (1889) t. 86; *Pilger in Pflanzenr.* iv, 5 (1903) 51; *Cheesem. Man. N.Z. Fl.* (1906) 655; *Ill. N.Z. Fl.* (1914) t. 188.

North Island: Between the Bay of Islands and Whangarei, *R. Mair!* Great Barrier Island, *T. Kirk!* from Cape Colville to the Thames goldfields and Te Aroha, *T. Kirk! Adams! T. F. C.;* from Lake Taupo to the Ruahine Mountains and the Tararua Range, *Colenso! T. F. C., Tryon! R. Mair! Cockayne! A. Hamilton! B. C. Aston.* South Island, Stewart Island: Not uncommon in mountain forests, chiefly on the western side of the island. Sea-level to 4000 ft. *Mountain-pine; Yellow Silver-pine.*

Wood reddish-yellow, highly resinous and very inflammable, of great strength and durability; largely used in Westland (together with *D. Colensoi*) for railway sleepers, telegraph-poles, &c.

6. **D. Colensoi** *Hook. Ic. Plant.* (1843) t. 548 (*not of Hook. f.*).—A small tree 20–40 ft. high or more, very similar in mode of growth to *D. intermedium*, but rather taller and more conical, with a straighter and cleaner trunk; branchlets more slender, often flexuous, $\frac{1}{20}$–$\frac{1}{15}$ in. diam. Leaves of very young plants lax, spreading, $\frac{1}{4}$–$\frac{1}{2}$ in. long, narrow linear-subulate, terete, decurrent at the base; gradually passing into the leaves of young trees, which are more closely set, $\frac{1}{8}$–$\frac{1}{6}$ in. long, lanceolate or narrow-triangular, acute, falcate, flat, decurrent at the base, often more or less spreading in one plane, giving the branchlets a distichous appearance. These pass by insensible gradations into those of mature trees, which are small and scale-like, densely quadrifariously imbricate and appressed to the branch, $\frac{1}{20}$–$\frac{1}{12}$ in. long, rhomboid, obtuse or subacute, thick and coriaceous, keeled, apex often incurved. Flowers dioecious. Males solitary, terminal, sessile, $\frac{1}{8}$–$\frac{1}{6}$ in. long; anthers numerous; connective broad, triangular, acute. Female flowers at the tips of the branchlets. Nuts 1 or 2, oblong, obtuse, not compressed, about $\frac{1}{12}$ in. long, enclosed for $\frac{1}{3}$ of their length or more in a lax cup-shaped aril.—*Pilger in Pflanzenr.* iv, 5 (1903) 51; *Cheesem. Man. N.Z. Fl.* (1906) 655. D. Westlandicum *T. Kirk in Trans. N.Z. Inst.* x (1878) 387, t. 18; *Forest Fl.* (1889) t. 85; *Hook. f. Ic. Plant.* (1877) t. 1218.

North Island: Between Mangonui and Kaitaia, *H. Carse!* Waipoua Forest, *Cockayne;* Whangaroa, *Hector!* between the Bay of Islands and Whangarei, *Colenso;* Great Barrier Island, *T. Kirk!* Waimarino Forest, *T. Kirk, T. F. C.;* forests round the base of Ruapehu and adjoining mountains, *T. F. C., E. Phillips Turner, Cockayne.* South Island: Not uncommon along the West Coast from Collingwood to Martin's Bay, *T. Kirk! Spencer! W. Townson! J. W. Brame! Helms!* &c. Sea-level to 3000 ft. *Silver-pine.*

Very close to the preceding; but the leaves of the young trees are much flatter, more decurrent, and often distichous; the mature leaves are smaller and the branchlets more slender; and the nuts are smaller, often 2 together, and are enclosed sometimes almost as far as the middle in the unusually well-developed aril. The wood is yellowish-white, straight-grained, strong and compact, very durable. It is exported from Westland to all parts of the colony for railway-sleepers, and has been used with good results for the framework of bridges, wharves, &c.

D. Colensoi is a species which has been much misunderstood. By nearly all writers the name has been applied to the mountain-plant originally described by Sir W. J. Hooker in the "Icones Plantarum" (t. 544) as *Podocarpus*(?) *biformis*, the *Dacrydium biforme* of this work, although the two species are in reality totally different. The mistake appears to have originated in the "Flora Novæ Zelandiæ," where Sir J. D. Hooker quoted *Podocarpus*(?) *biformis* as a synonym of *D. Colensoi*. His description is based entirely on *D. biforme*, and the localities given (Dusky Bay, *Menzies;* Tongariro and Ruahine Mountains, *Colenso;* mountains near Nelson, *Bidwill*) all unquestionably refer to the same plant. It is curious that, although the original plate of *D. Colensoi* is cited in the Flora, no reference is given to the locality in which the species was first discovered. From a letter of Mr. Colenso's sent with the type specimens, and published in the *London Journal of Botany* (vol. i, p. 301), this appears to have been the rough forest country between Whangarei and the Bay of Islands—a station quite 250 miles to the north of the northern limit of *D. biforme*. Early in the preparation of this work a comparison of the original descriptions and figures convinced me that, although the plate of *Podocarpus*(?) *biformis* was a very faithful representation of the plant to which all New Zealand botanists, following the example of Sir J. D. Hooker, at that time assigned the name of *Colensoi*, it by no means corresponded with the original plate of *D. Colensoi*. Not only did the two plants differ in a marked degree in habit and foliage, but the figures given of the fruit of *D. Colensoi* were so unlike that of *D. biforme* as to make their specific distinctness beyond all doubt. It therefore became necessary to restore *Podocarpus*(?) *biformis* to the rank of a species under the name of *D. biforme*. Further study of the original plate of *D. Colensoi* made it clear that two subsequently described species—*D. intermedium* and *D. Westlandicum*—were evidently close allies, *intermedium* so far as the foliage was concerned, *Westlandicum* with respect to the fruit. Under these circumstances I applied to Kew with the object of having these two plants compared with the type specimens, but, unfortunately, it was found that the latter were no longer in the herbarium. About this time Dr. Pilger, of Berlin, took up the study of the *Taxaceae* for "Das Pflanzenreich." Fortunately, he found one of Colenso's original specimens in the Imperial Herbarium at Vienna. He has thus been able to compare it with the other New Zealand species, and has satisfied himself that it is identical with *D. Westlandicum*. I willingly accept this determination, although *D. Westlandicum* usually has much more slender branches than those figured in the original plate. I am also glad to take this opportunity of referring New Zealand students to Dr. Pilger's memoir, which contains carefully prepared descriptions of the whole of the New Zealand Taxads, and much valuable information respecting them.

7. **D. laxifolium** *Hook. f. in Hook. Lond. Journ. Bot.* iv (1845) 143.—A small prostrate shrub with very slender trailing branches 3–24 in. long; rarely suberect, and reaching a height of 2 ft. Leaves of young plants lax, spreading, $\frac{1}{5}$–$\frac{1}{3}$ in. long, narrow-linear, acute, flat, curved; with the growth of the plant gradually becoming shorter, broader and thicker, and more closely set. Leaves of mature plants varying from $\frac{1}{8}$ in. long, linear-oblong, obtuse or subacute, spreading, $\frac{1}{25}$–$\frac{1}{20}$ in. long, broadly ovate or oblong, obtuse, keeled or rounded on the back, closely imbricate. Flowers dioecious or monoecious. Males solitary, terminal, sessile, $\frac{1}{5}$–$\frac{1}{4}$ in. long. Female flowers solitary and terminal. Nut small, erect, oblong, obtuse with a small curved apiculus, about $\frac{1}{8}$ in. long; receptacle sometimes dry, sometimes swollen and succulent.—*Hook. f. Ic. Plant.* (1852) t. 825; *Fl. Nov. Zel.* i (1853) 234; *Handb. N.Z. Fl.* (1864) 269; *T. Kirk in Trans. N.Z. Inst.* x (1878) 388; *Forest Fl.* (1889) t. 87; *Pilger in Pflanzenr.* (1903) 50; *Cheesem. Man. N.Z. Fl.* (1906) 657; *Ill. N.Z. Fl.* (1914) t. 189; *Cockayne Veg. N.Z.* (1921) t. 41.

NORTH ISLAND: Tongariro, *Bidwill, Hector! T. F. C.;* Ruapehu, *Spencer! T. F. C.;* Ruahine Mountains, *Colenso! H. Hill! A. Hamilton! B. C. Aston!* SOUTH ISLAND, STEWART ISLAND: Common in mountain districts throughout. Usually between 2500 and 4000 ft., but descends to sea-level in Stewart Island.

A very remarkable little species, probably the smallest known pine. Fruiting specimens can often be seen barely 3 in. in diameter, although the usual size of the plant is much more. The minute imbricated leaves are often entirely wanting, even in old plants; at other times both imbricated and spreading leaves occur on the same branch.

3. **PHYLLOCLADUS** L. C. Rich. 1826.

Trees or shrubs; branches often whorled; branchlets flattened and expanded into rigid and coriaceous toothed or lobed leaf-like cladodia. True leaves reduced to linear scales. Flowers monoecious or dioecious. Males fascicled at the tips of the branchlets, catkin-like, peduncled; each peduncle arising from the axil of a leafy bract. Staminal column oblong or cylindrical; anthers numerous, densely spirally imbricate, 2-celled; connective prolonged into an acute claw. Female flowers sessile on the margins of the cladodia or on peduncle-like divisions of the cladodia. Ovuliferous scales 1 or several, thick and fleshy, free. Ovule solitary, erect. Seeds erect, ovoid or oblong, compressed, protruding from the enlarged and fleshy scales, each seated within a cup-shaped aril Cotyledons 2.

Besides the 3 species found in New Zealand, there is one in Tasmania, another in Borneo, and a sixth in New Guinea and the Philippine Islands. The genus is remarkable for the flattened cladodes or leaf-like branchlets, which take the place of the true leaves, these last being reduced to linear deciduous scales. The New Zealand species have been excellently described and figured by Mr. Kirk in vol. x of the "Transactions of the New Zealand Institute" and in his "Forest Flora."

* Cladodes pinnately arranged.

Tree 50–70 ft. Cladodes ½–1 in. Female flowers on the margins of the cladodes	1. *P. trichomanoides.*
Tree 25–40 ft. Cladodes 1–2½ in. Female flowers peduncled on the rhachis below the cladodes	2. *P. glaucus.*

** Cladodes simple.

Shrub or tree 5–25 ft. Cladodes ½–1 in. Female flowers on the margins of the cladodes near the base	3. *P. alpinus.*

1. **P. trichomanoides** *D. Don in Lamb. Pin.* ed. ii, App.—A tall graceful tree 50–70 ft. high; trunk 1–3 ft. diam.; branches whorled, slender, spreading. Cladodes or flattened leaf-like branchlets alternate and distichous on whorled rhachises 1–3 in. long, each rhachis and its cladodes resembling a pinnate leaf; each cladode ½–1 in. long, obliquely cuneate or rhomboid, thick and coriaceous, lobed or pinnatifid, the lobes truncate or erose; veins spreading. Leaves of seedling plants ½–¾ in. long, narrow-linear, soon deciduous; of older plants reduced to minute subulate scales at the base of the rhachises of the cladodes or of the cladodes themselves. Flowers monoecious. Males in fascicles of 5–10 at the tips of the branchlets, ⅓–½ in. long. Females on the margins of modified cladodes at the tips of the branchlets, cladodes much reduced in size, often little more than a peduncle, each flower in the axil of a minute subulate bract. Nuts solitary, compressed, half exserted beyond the thickened and fleshy scales; aril cupular, with an irregularly crenulate margin.—*A. Cunn. Precur.* (1836) n. 326; *Raoul Choix* (1846) 41; *Hook. Ic. Plant.*

Hook Ic. Plant. tab. 549–551 Rich.
P. trichomanoides – Rich. Conif. p. 23
d129, K.S.

(1843) t. 549, 550, 551 ; *Hook f. Fl. Nov. Zel.* i (1853) 235 ; *Handb. N.Z. Fl.* (1864) 259 ; *T. Kirk in Trans. N.Z. Inst.* x (1878) 381 ; *Forest Fl.* (1889) t. 6, 7 ; *Pilger in Pflanzenr.* iv, 5 (1903) 97 ; *Cheesem. Man. N.Z. Fl.* (1906) 658 ; *Ill. N.Z. Fl.* ii (1914) 190. P. rhomboidalis *A. Rich. Fl. Nouv. Zel.* (1832) 363 (*not of L. C. Rich.*).

North Island : In forests from the North Cape to Taranaki and Hawke's Bay, not uncommon. South Island : Northern portions of Nelson and Marlborough, advancing along the West Coast as far south as Westport. Sea-level to 2500 ft. *Tanekaha ; Toatoa ; Celery-leaved Pine.*

Wood white, close-grained, free from knots and other defects, very serviceable for sleepers, piles, the timbers of bridges, and probably for general building purposes. Bark often used for tanning, and by the Maoris for the preparation of a red dye.

2. **P. glaucus** *Carr. Trait. Gen. Conif.* (1855) 502.—A small handsome tapering tree 25–40 ft. high ; branches stout, whorled ; trunk 12–18 in. diam., rarely more. Cladodes or flattened leaf-like branchlets alternate and distichous on a rhachis 4–12 in. long, glaucous when young, 1–2½ in. long, rhomboid or obliquely ovate-cuneate, extremely coriaceous, deeply or coarsely toothed or lobed, lobes obtuse or acute. True leaves on seedling plants ½–1 in. long, linear, obtuse, membranous ; on mature plants chiefly developed at the base of the young rhachises and falling away very early. Flowers dioecious or monoecious. Males very numerous, in fascicles of 10–20 at the tips of the branches, ¾–1 in. long, on stout peduncles of equal length. Female flowers forming globose heads terminating short stout distichous peduncles (modified cladodes) springing from the rhachis below the cladodes ; fully ripe heads ½ in. long. Nuts 8–20, compressed, about ⅛ in. long, half exserted beyond the thickened scales ; aril cupular.—*T. Kirk in Trans. N.Z. Inst.* i (1868) 149, *and* x (1878) 380 ; *Forest Fl.* (1889) t. 98, 99 ; *Pilger in Pflanzenr.* iv, 5 (1903) 95 ; *Cheesem. Man. N.Z. Fl.* (1906) 658.

North Island : Mongonui County, *H. Carse !* between Whangape and Hokianga, *T. Kirk !* between Hokianga and the Northern Wairoa, *Petrie !* Puhipuhi Forest, *R. Mair !* Great Barrier Island, Omaha, *T. Kirk !* Waitakerei Ranges and Birkdale (near Auckland), *T. F. C. ;* from Cape Colville to the Thames goldfields and Te Aroha, *T. Kirk ! Adams ! T. F. C. ;* Wairoa South, *T. Kirk !* near Titiraupenga, *T. F. C. ;* Rainbow Mountain (near Waiotapu), *E. Phillips Turner !* Sea-level to 2000 ft. *Toatoa.*

A very distinct species, quite the most handsome of the New Zealand Taxads, and easily recognized by the robust branches, very large cladodes, and large female flowers. Carrière's description, founded on garden specimens of doubtful origin cultivated in France, hardly agrees with wild specimens, but probably refers to the same species.

3. **P. alpinus** *Hook. f. Fl. Nov. Zel.* i (1853) 235, t. 53.—A shrub or small tree, usually from 8–25 ft. high, but in exposed alpine localities often reduced to a bush of 3–6 ft. ; branches numerous, short, stout, spreading ; trunk short, 6–14 in. diam. Cladodes simple, crowded, spreading, ½–1½ in. long, variable in shape, linear-oblong to oblong-rhomboid, obtuse or acute, very coriaceous, glaucous, lobed or pinnatifid, lobes usually obtuse. True leaves on seedling plants linear, ¼–½ in. long. Flowers monoecious. Males in fascicles of 2–5 at the tips of the branchlets, ¼–⅓ in. long ; peduncles short, sometimes almost wanting. Females forming globose heads towards the base of the cladodes or on the margins of modified ones. Fully ripe heads about ¼ in. diam. ; scales fleshy, bright-red. Nuts small, compressed, exserted beyond the scales ; aril cupular, margin irregularly lobulate. — *Handb. N.Z. Fl.* (1864) 260 ; *T. Kirk in*

Trans. N.Z. Inst. x (1878) 382 ; *Forest Fl.* (1889) t. 100 ; *Pilger in Pflanzenr.* iv, 5 (1903) 98 ; *Cheesem. Man. N.Z. Fl.* (1906) 659. P. trichomanoides *var.* alpinus *Parl. in D.C. Prodr.* xvi, 2 (1868) 498.

North and South Islands : In subalpine and mountain forests from Cape Colville and Te Aroha to Foveaux Strait, abundant. Usually from 1500 to 5000 ft., but descends to sea-level in Westland and in the south of Otago. *Mountain Toatoa.*

Very closely allied to the Tasmanian *P. rhomboidalis* L. C. Rich. (*P. aspleniifolius* Hook. f.), principally differing in the position of the female flowers. It is a very important constituent of the subalpine forests of the South Island, particularly at high altitudes.

Family VIII. **TYPHACEAE.**

Marsh or water plants, with creeping rhizomes, solid cylindrical stems, and long linear leaves sheathing at the base. Flowers minute, monoecious, densely crowded in cylindric spikes or spadices, male spadices always uppermost. Perianth either wanting or of minute scales or hairs. Male flowers : Stamens 1–7 ; filaments slender, distinct or connate ; anthers basifixed, erect, linear or oblong. Female flowers : Ovary superior, sessile or stalked, 1- or rarely 2-celled ; styles as many as the cells, linear, persistent ; stigma unilateral, papillose ; ovules solitary. Fruit dry or spongy, indehiscent. Seed solitary, pendulous ; albumen copious, fleshy or farinaceous ; embryo terete, axile.

Consists of the single genus *Typha*, which is distributed over most parts of the world in marshy districts.

1. **TYPHA** Linn. Syst. I. 1755.

Tall reed-like marsh or aquatic herbs. Leaves all radical, long, linear, erect, spongy. Flowers monoecious, densely crowded in a terminal cylindrical spike furnished with a few deciduous spathaceous bracts ; spikes either continuous or separated into two distinct parts by a broad or narrow interval, the upper portion male, the lower female. Male flowers of 1–7 stamens intermixed with capillary membranous scales ; filaments short or long, distinct or connate ; anthers linear-oblong, basifixed, 4-celled, longitudinally dehiscent ; connective produced at the tip. Female flowers with or without a linear-spathulate bracteole at the base. Ovary long-stalked, the stalk furnished with numerous silky hairs, 1-celled, narrowed into a slender style ; stigma unilateral, linguiform or spathulate ; ovule solitary, pendulous. Fruit very minute, fusiform or narrow-ovoid ; pericarp membranous or coriaceous, at length laterally dehiscent. Seed the same shape as the pericarp ; albumen farinaceous ; embryo axile.

Species 10 to 12, spread over most temperate and tropical regions.

1. **T. angustifolia** *Linn. Sp. Plant.* (1753) 971.—Very variable in stature, 3–8 ft. high or more. Leaves as long as the flowering-stems or sometimes exceeding them, rather narrow, $\frac{1}{5}$–$\frac{1}{2}$ in. broad, rarely more, expanded at the base into a broad sheath often more than a foot in length, plano-convex or convex on both sides. Spike variable in length ; male portion usually from 2 to 6 in. long, in some varieties contiguous to the female part, in others separated from it by an interval sometimes as much as 1 in. long, axis of the spike furnished with reddish-brown hairs mixed with the flowers ; female portion 3–8 in. long, $\frac{1}{3}$–$\frac{3}{4}$ in. broad. Female flowers furnished at the base with a linear spathulate bracteole, the hairs on the pedicel of the

ovary shorter than the stigma.—*A. Rich. Fl. Nouv. Zel.* (1832) 99; *A. Cunn. Precur.* (1836) n. 319; *Raoul Choix* (1846) 41; *Hook. f. Fl. Nov. Zel.* i (1853) 238; *Handb. N.Z. Fl.* (1864) 276; *Cheesem. Man. N.Z. Fl.* (1906) 743. T. latifolia *Forst. f. Prodr.* (1786) n. 336 (*not of Linn.*); *Hook. f. Handb. N.Z. Fl.* (1864) 772.

Kermadec Islands, North and South Islands: Abundant in marshy places throughout. Sea-level to 2000 ft. *Bulrush; Raupo.* December–March.

Almost cosmopolitan. The Australian and New Zealand forms are placed by Graebner (Das Pflanzenreich, Heft 2) under var. *Brownii* (*T. Brownii* Kunth) and var. *Muelleri* (*T. Muelleri* Rohrb.). The first of these includes the larger and coarser states, with much of the habit of *T. latifolia*, and, like it, with the male and female spikes contiguous. It differs, however, from *T. latifolia* in the female flowers being bracteolate at the base. Var. *Muelleri* is smaller, and usually has the male and female spikes separated by a distinct interval.

The pollen was formerly collected by the Maoris, made into cakes with water, and then baked and eaten; the starchy rhizome was also used for food in times of scarcity. The leaves were employed for constructing the walls of their houses, or whares, and are still used for the same purpose.

Family IX. **PANDANACEAE.**

Trees or shrubs or climbers, frequently with aerial roots. Leaves usually long and narrow, acuminate, sheathing at the base, coriaceous, keeled, margins and keel spinulose-serrate. Flowers dioecious, both sexes densely crowded on simple or branched spadices protected by leafy spathes. Perianth wanting. Male flowers: Stamens numerous; filaments all distinct or connate in clusters; anthers erect, basifixed, 2-celled. Rudimentary ovary present or absent. Female flowers: Staminodia small or wanting. Ovary 1-celled, free or connate with those of adjoining flowers; stigma nearly sessile, papillose; ovules either solitary and basal, or numerous and attached to parietal placentas. Fruit an oblong or globose mass of densely compacted free or connate tough or fleshy drupes. Seeds solitary or many in each drupe; testa striated; albumen hard and fleshy; embryo minute.

A small order of 3 genera and about 220 species; most abundant in the islands of eastern tropical Africa and the Malay Archipelago, extending southwards to Australia, the Pacific islands, and New Zealand; not known in a native state in America. The leaves of most of the species are used for mat-making, thatching, &c., and would probably be useful for the manufacture of paper. The New Zealand genus extends as far north as Malacca.

Seem Bull

1. **FREYCINETIA** Gaud. 1824. 2:1926:92.

Climbing or scrambling shrubs. Stems often very long, branched, rooting. Leaves long, linear, sheathing at the base, keeled, entire or more usually serrulate. Spadices terminal, fascicled, sessile or pedunculate, enclosed within foliaceous bracts with fleshy and often coloured bases. Male flowers numerous, each one consisting of several stamens surrounding a rudimentary ovary; filaments short; anthers oblong. Female flowers of many 1-celled ovaries densely packed on the rhachis of the spadix, cohering at their bases, each ovary surrounded by minute staminodia, apex broad, truncate, c enulate; placentas 2 or more; ovules numerous, in 2 series on each placenta. Fruit an oblong mass of more or less fleshy or almost woody berries. Seeds numerous, fusiform or ellipsoid; testa crustaceous or membranous; albumen copious; embryo basilar.

A genus of over 50 species, scattered through Malaya, the Pacific islands, and Australia, with one species in New Zealand.

1. **F. Banksii** *A. Cunn. Precur.* (1836) n. 320.—A lofty climber, often reaching the tops of tall trees, or scrambling over rocks or prostrate trunks; branches many, stout, rooting. Leaves numerous towards the tips of the branches, 1½–3 ft. long, ½–1 in. broad, linear-elongate, finely acuminate, broadly sheathing at the base, concave, coriaceous, nerved, margins and midrib minutely spinulose-serrate. Spadices fascicled at the tips of the branches, cylindrical, peduncled, 3–6 in. long, dioecious; bracts numerous, leafy, the innermost with white or pale-lilac thick and succulent bases. Filaments rather long, filiform. Ovaries very densely packed, about ⅓ in. long, rather fleshy in fruit. Seeds small, linear-oblong; testa cellular.—*Raoul Choix* (1846) 41; *Hook. f. Fl. Nov. Zel.* i (1853) 237, t. 54, 55; *Handb. N.Z. Fl.* (1864) 275; *Bot. Mag.* t. 6028; *Cheesem. Man. N.Z. Fl.* (1906) 741.

North Island: Abundant in forests from the North Cape to the East Cape and Taranaki, less plentiful from thence southwards to Wellington. South Island: Lowland districts in Nelson and Marlborough, and along the West Coast from Collingwood to Okarito and Milford Sound, not common. Sea-level to 2500 ft. *Kiekie; Tawhara* (the edible bracts); *Ureure* (the fruit). September–November; ripe fruit in May.

The leaves are occasionally plaited into kits or baskets by the Maoris. The white fleshy bracts surrounding the spadices are sweet and sugary, with an aromatic flavour, and are often eaten; the fruit less commonly so. I have seen no description of *F. inclinans* Benn. Pl. Jav. Rar. i, 32, said to be found in New Zealand. It is not generally known that when growing near a plentiful supply of water *Freycinetia* puts out numerous "floating roots." These are sometimes several feet in length, and are excessively branched, the ultimate divisions being filiform. They are regularly girdled with conspicuous spongy or corky whitish rings, which give the roots a very remarkable appearance. It is hoped that their structure and use will shortly be investigated.

Family X. SPARGANIACEAE.

Marsh or water plants with creeping rhizomes. Stems simple or branched, erect or floating. Leaves usually crowded at the base of the stems, linear, sheathing at the base. Flowers monoecious, crowded in distant globose heads towards the summit of the stem and its branches, the lower heads female, the upper male. Perianth of 3–8 irregular chaffy scales. Male flowers: Stamens 3–4, rarely more; their filaments distinct; anthers oblong, dehiscing longitudinally. Female flowers: Ovary ovoid or oblong, sessile or nearly so, 1–2-celled, produced into 1–2 long or short styles; stigma unilateral; ovule solitary, pendulous. Fruit obovoid, spongy, tipped by the persistent style; endocarp bony. Seed with a membranous testa; albumen farinaceous; embryo axile.

A small family, consisting of the single genus *Sparganium* Linn., which comprises sixteen or eighteen well-defined species. All these are confined to the North Temperate Zone, with the exception of the New Zealand species, which is also found in Australia.

1. SPARGANIUM Linn.

Characters of the family, as above.

1. **S. antipodum** *Graebner in Allg. Bot. Zeitschr.* iv (1899) 33.—Stems slender, erect, 1–2 ft. high. Leaves very long, the lower radical ones usually far surpassing the inflorescence, $\frac{1}{10}$–$\frac{1}{5}$ in. broad, flattish above, acutely and prominently keeled beneath, tip acute, lower portion expanded

S. subglobosum Morong Bull. Torr. Bot. Club. 15:(5) 1888 73–81. t. 1x12.

into a long but rather narrow sheath. Inflorescence simple in small specimens, but usually with 1–3 slender flexuous branches bearing male heads alone or very rarely with a single female below the males; main rhachis with 2–4 distant female heads below, and 3–12 more closely placed male ones above; the lower portion of the inflorescence with long leafy bracts. Filaments of the male flowers long, considerably more than twice the length of the scales. Stigma narrow, elongate. Ripe fruit about $\frac{1}{6}$ in. long, broadly obovoid, mucronate with the short thick persistent style.—*Cheesem. Man. N.Z. Fl.* (1906) 744; *Ill. N.Z. Fl.* ii (1914) t. 205. S. angustifolium *R. Br. Prodr.* (1810) 338 (*not of Michx.*); *Benth. Fl. Austral.* vii (1878) 160; *Col. in Trans. N.Z. Inst.* xvi (1884) 339. S. simplex *Hook. f. Fl. Nov. Zel.* i (1853) 238; *Handb. N.Z. Fl.* (1864) 277 (*not of Huds.*).

North Island: Watery places from the North Cape to Wellington, not uncommon. South Island: Near Picton, *J. Rutland!* swamps at Methven, Canterbury, *Dr. Gaze Maru.* December–March.

Also in Australia, from Queensland to Victoria. *S. subglobosum* Morong in Bull. Torrey Club, xv (1888) 76, t. 79, f. 1, said to have been collected at the Bay of Islands by the American Exploring Expedition, is probably the same, and, if so, Morong's name will take precedence.

see Hutch. 1934: 39 Syn class.

Family XI. NAIADACEAE.

Submerged or floating fresh-water or marine aquatic plants, or marsh herbs. Stems often elongated, slender, branched, jointed; sometimes short and almost wanting. Leaves very various, altogether submerged and translucent, or floating and opaque, or all radical, sheathing at the base; stipules wanting or interpetiolar, connate and sheathing. Flowers small and inconspicuous, usually green, hermaphrodite or unisexual, variously arranged. Perianth either wanting, or of 3–6 inferior segments valvate in bud. Stamens 1–6, hypogynous; anthers basifixed, erect, 1–2-celled. Ovary superior, of 1–6 distinct or more or less connate carpels, each 1-celled with usually a single erect or pendulous ovule; style long or short, stigma various. Fruit of 1–6 indehiscent nutlets or utricles, rarely drupaceous. Seed solitary, testa membranous; albumen wanting; embryo straight or curved, radicle unusually large.

A small family, dispersed over the whole world in marshy places, ponds, lakes, rivers, &c., also including some widely spread marine plants. Genera 16, species estimated at 120. The order cannot be said to have any important properties or uses. With the exception of *Lepilaena*, which is found elsewhere in Australia alone, all the New Zealand genera have a wide range in both temperate and tropical climates. The *Naiadaceae* are now frequently broken up into three or four families, but in a small flora like that of New Zealand it seems undesirable to multiply such divisions.

A. Flowers hermaphrodite. Perianth of 4–6 herbaceous segments.

Marsh plants with linear radical leaves. Flowers on erect scapes. Perianth-segments 6 .. .. 1. Triglochin.

Aquatic plants with submerged or floating stems and leaves. Flowers in axillary or terminal spikes. Perianth-segments 4.. 2. Potamogeton.

B. Flowers unisexual (except in Ruppia). *Perianth wanting or minute and hyaline.*

* Stems and leaves filiform, submerged.

Flowers hermaphrodite, 2 or 3 on a peduncle greatly elongating in fruit. Perianth wanting. Stamens 2; anthers almost sessile.. .. .. 3. Ruppia.

Flowers unisexual, axillary, nearly sessile. Perianth wanting or female small and hyaline. Stamen 1, filament slender .. 4. Zannichellia.

Flowers unisexual, axillary, nearly sessile. Perianth of 3 hyaline scales. Stamens 3; anthers sessile, cohering by their backs into a columnar mass .. .. 5. LEPILAENA.

** Stems creeping in sand or mud in salt water. Leaves ribbon-like, flat, nerved.

Flowers unisexual, enclosed in the membranous sheathing base of a floral leaf .. .. 6. ZOSTERA.

1. **TRIGLOCHIN** Linn.

Perennial marsh herbs. Roots fibrous. Leaves all radical, filiform or rush-like, flat or terete. Scapes slender, naked, erect, bearing a raceme or spike of small green hermaphrodite flowers. Perianth-segments 3 or 6, herbaceous, concave, deciduous. Stamens 6, inserted on the base of the perianth-segments; filaments very short; anthers didymous, extrorse. Carpels 6, distinct or more or less connate; stigmas penicillate; ovules solitary in each carpel, basilar, erect, anatropous. Fruit of 3 or 6 free or connate coriaceous nutlets separating from a central axis. Seeds erect, cylindric or ovoid, terete or compressed; testa membranous; embryo straight.

About 12 species are known, spread through most temperate or subtropical regions, but especially plentiful in Australia. Both the New Zealand species are widely distributed.

Triglochin is often regarded as forming (with 3 other small genera) a distinct order (*Juncaginaceae*), but for the purposes of this work it appears most convenient to merge it with the *Naiadaceae*.

Scape 3–10 in. high. Fruit subglobose .. .. .. 1. *T. striata.*

Scape 6–24 in. high. Fruit clavate .. .. 2. *T. palustre.*

1. **T. striata** *Ruiz and Pav. Fl. Per.* iii, 72; *var.* **filifolium** *Buch. Index Crit.* (1868) 59.—Rhizome short, stoloniferous. Leaves numerous, very narrow-linear or almost filiform, semi-terete, variable in length, shorter or rather longer than the scape. Scape 3–10 in. high; raceme usually occupying about $\frac{1}{2}$ the length. Flowers numerous, shortly pedicelled, minute, about $\frac{1}{12}$ in. diam. Outer perianth-segments broadly ovate; inner smaller and narrower. Perfect stamens 3, at the base of the outer segments; three inner abortive, without pollen, sometimes altogether wanting. Fruit globose, $\frac{1}{10}$ in. diam., of 3 perfect carpels separating from a central axis and leaving 3 scale-like barren ones attached to it.—*Buchenau in Pflanzenr.* iv (1903) 10; *Cheesem. Man. N.Z. Fl.* (1906) 747. T. striata *Benth. Fl. Austral.* vii (1878) 166. T. triandra *Michx. Fl. Bor. Am.* i (1803) 208; *Hook. f. Fl. Nov. Zel.* i (1853) 236; *Handb. N.Z. Fl.* (1864) 278. T. flaccida *A. Cunn. Precur.* (1836) n. 231; *Raoul Choix* (1846) 41. T. filifolium *Sieb. ex Spreng. Syst.* iv (1825) 142; *Hook. Ic. Plant.* (1843) t. 579.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout in marshes near the sea; also inland in various localities in the thermal-springs district from Te Aroha and Rotorua to Taupo and Tokaanu. October–January.

The New Zealand variety is also found in Australia, Tasmania, and Chile; the typical state ranges throughout almost the whole of North and South America, and also occurs in South Africa.

2. **T. palustris** *Linn. Sp. Plant.* (1753) 338.—Rhizome short, stoloniferous. Leaves all radical, much shorter than the scape, narrow-linear or filiform, semiterete, upper surface faintly grooved. Scape slender, 6–24 in.

high; raceme elongating after flowering. Flowers numerous, shortly pedicelled, minute, green or greenish-purple. Perianth-segments ovate, all equal. Stamens 6, all fertile; anthers purple. Fruit appressed to the rhachis, linear-clavate, $\frac{1}{4}$ in. long; carpels 3, very slender, almost awned at the base, attached to the axis by the tip.—*Cheesem. in Trans. N.Z. Inst.* xiv (1882) 300; *Man. N.Z. Fl.* (1906) 747.

South Island: Canterbury—Broken River, *J. D. Enys* and *T. F. C.*; Rangitata Valley, *Haast!* Lake Tekapo and Tasman Valley, *T. F. C.* Otago—Ophir, Black's, *Petrie!* 2000–3000 ft. December–January.

A plant with a wide distribution in the Northern Hemisphere, also found in extratropical South America, but not yet detected in Australia.

2. **POTAMOGETON** Linn.

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A genus widely spread in the fresh or brackish waters of almost all temperate or subtropical regions, more rare in the tropics. Species variously estimated at from 40 to 100 or more, according to the different views of authors, extremely variable, and most difficult of discrimination. The New Zealand forms have never been carefully sought for, and in all probability other species will be added to those described herein.

A. Floating leaves more or less coriaceous, with a broad long-petioled lamina, different in shape from the membranous submerged ones. Stipules free.

Floating leaves 2–4 in., biplicate at the base. Submerged leaves wanting or reduced to phyllodes. Fruit large, $\frac{1}{6}$ in. long, keeled on the back when dry	1. *P. natans.*
Floating leaves 1–3 in., not plicate at the base. Submerged leaves few, linear-lanceolate. Fruit small, $\frac{1}{12}$–$\frac{1}{10}$ in., rounded on the back	2. *P. polygonifolius.*
Floating leaves $\frac{3}{4}$–$1\frac{3}{4}$ in. Submerged leaves numerous, 2–4 in. Fruit small, $\frac{1}{10}$ in., keeled on the back when dry	3. *P. Cheesemanii.*

B. Leaves all submerged and uniform, sessile, membranous.

Leaves 1–4 in. by $\frac{1}{8}$–$\frac{1}{4}$ in., linear-ligulate, obtuse; stipules free, lacerate. Spike dense	4. *P. ochreatus.*
Leaves 2–4 in. by $\frac{1}{20}$–$\frac{1}{15}$ in., very narrow-linear or filiform; stipules adnate. Spike interrupted	5. *P. pectinatus.*

1. **P. natans** *Linn. Sp. Plant.* (1753) 126.—Stems creeping below, long or short, simple or sparingly branched, terete. Floating leaves on long petioles; lamina 2–4 in. long, oblong or elliptic or elliptic-lanceolate, acute or subacute, subcordate and shortly biplicate at the base, coriaceous, 20–30-nerved with copious cross-veins and minute areolation; stipules very long and conspicuous, 3–5 in., free, acuminate. Submerged leaves

See J. A. Hagstrom in K. B. V. Handbk 13:55, No. 5, 1916. pp. 75, 157, 172, 182.

wanting or if present few and reduced to long and narrow phyllodes without any lamina. Peduncles stout, 2–4 in. long, bearing a dense-flowered spike 1½–2 in. long. Perianth-segments broadly rhomboidal. Fruit ⅙ in. long, turgid, obliquely ovoid, keeled on the back when dry, beak short.—*Hook. f. Fl. Nov. Zel.* i (1853) 236; *Handb. N.Z. Fl.* (1864) 278; *Benth. Fl. Austral.* vii (1878) 170 (*in part*); *A. Bennett in Journ. Bot.* xxv (1887) 177; *Cheesem. Man. N.Z. Fl.* (1906) 748.

North and South Islands: I have seen specimens from both Islands, and have gathered it myself in the Waikato River near Huntly. Mr. Arthur Bennett, whose knowledge of the genus is unrivalled, also informs me that he has seen undoubted specimens from New Zealand. It must, however, be rare; for in an expedition made a few years ago along the whole course of the Lower Waikato I failed to find it, although all the other species known from New Zealand were observed.

2. **P. polygonifolius** *Pourr. in Mem. Acad. Toul.* iii (1788) 325.—Stem creeping at the base, long or short, simple or sparingly branched. Floating leaves on long petioles; lamina 1–3 in. long, elliptic-oblong to lanceolate, acute or obtuse, rounded or subcordate or acute at the base, not plicate, thinly coriaceous; stipules much shorter than in *P. natans*, 1–1½ in. long. Submerged leaves linear-lanceolate, acute. Peduncles variable in length, rather slender; spike dense-flowered, ¾–1½ in. long. Perianth-segments transversely elliptic. Fruit small, reddish, $\frac{1}{12}$–$\frac{1}{10}$ in. long, blunt and rounded on the back, not keeled, beak very short.—*T. Kirk in Trans. N.Z. Inst.* iii (1871) 165; *Cheesem. Man. N.Z. Fl.* (1906) 749.

North and South Islands, Stewart Island: Ponds and small streams from the North Cape southwards, not uncommon. Sea-level to 4500 ft. December–April.

Distinguished from *P. natans* by the smaller and more membranous leaves, much shorter stipules, slender peduncles, and much smaller fruit not keeled on the back when dry. Several of my specimens have been examined by Mr. A. Bennett, who informs me that their identity with *P. polygonifolius* cannot be questioned. The

Althenia tricostata (T. Kirk) Asch.
Tasmanian Pondweed - Potamogeton.
see p 131 of this book.

The most abundant [illegible] numerous submerged leaves and smaller floating ones at once separate it from *P. natans*, to say nothing of other differences. According to Mr. Bennett, it is also found in Tasmania.

high; raceme elongating after flowering. Flowers numerous, shortly pedicelled, minute, green or greenish-purple. Perianth-segments ovate, all equal. Stamens 6, all fertile; anthers purple. Fruit appressed to the rhachis, linear-clavate, $\frac{1}{4}$ in. long; carpels 3, very slender, almost awned at the base, attached to the axis by the tip.—*Cheesem. in Trans. N.Z. Inst.* xiv (1882) 300; *Man. N.Z. Fl.* (1906) 747.

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North and South Islands, Stewart Island: Ponds and small streams from the North Cape southwards, not uncommon. Sea-level to 4500 ft. December–April.

Distinguished from *P. natans* by the smaller and more membranous leaves, much shorter stipules, slender peduncles, and much smaller fruit not keeled on the back when dry. Several of my specimens have been examined by Mr. A. Bennett, who informs me that their identity with *P. polygonifolius* cannot be questioned. The species is widely spread in Europe and Asia, and has been recorded from Australia.

3. **P. Cheesemanii** *A. Bennett in Journ. Bot.* xxi (1883) 66.—Stems slender, striated, long or short, simple or branched. Upper leaves alternate or opposite, long-petioled; lamina ¾–1¾ in. long, elliptic-oblong to oblong or lanceolate, obtuse, rounded at the base, coriaceous, 10–16-nerved with numerous cross-veins and minute areolation; stipules broad, subacute. Submerged leaves numerous, usually alternate but sometimes opposite, shortly petioled, 2–4 in. long, ¼–¾ in. broad, oblong-lanceolate to lanceolate or linear, very thin and membranous, translucent, 5–12-nerved with rather distant cross-veins, margins often undulate or crisped, not denticulate. Peduncles variable in length, rather slender; spike dense, ½–¾ in. long. Perianth-segments rhombic-orbicular. Fruit small, about $\frac{1}{10}$ in. long, broadly ovoid, slightly compressed, keeled on the back, beak short.—*A. Bennett l.c.* xxv (1887) 177; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 410; *Man. N.Z. Fl.* (1906) 749; *Ill. N.Z. Fl.* ii (1914) t. 206. P. heterophyllus *Hook. f. Handb. N.Z. Fl.* (1864) 742 (*not of Schreber*). P. natans *var.* australis *T. Kirk ex. A. Bennett in Journ. Bot.* xxv (1887) 177.

North and South Islands, Stewart Island: Abundant throughout in streams, ponds, and lakes. Sea-level to 3000 ft. *Manihi.* November–March.

The most abundant species, universally distributed throughout the Dominion. The numerous submerged leaves and smaller floating ones at once separate it from *P. natans*, to say nothing of other differences. According to Mr. Bennett, it is also found in Tasmania.

Ann Sc. Nat. 2 t. 18 (1836) 117.

4. **P. ochreatus** *Raoul Choix* (1846) 13, t. 7.—Stems slender, striate, branched, long or short according to the depth of the water. Leaves all submerged, alternate or the upper opposite, sessile, 1–4 in. long, $\frac{1}{8}$–$\frac{1}{4}$ in. broad, linear-ligulate, obtuse or emarginate at the tip, membranous, 3- or 5-nerved with or without finer parallel veins between, transverse veins few; stipules free, at length conspicuously lacerate. Peduncles stout, erect, usually shorter than the leaves, 1–3 in. long; spike short, oblong, about $\frac{1}{2}$ in. long. Fruit broadly obliquely ovoid, subcompressed, $\frac{1}{10}$ in. long, back rounded, beak short, thick.—*Hook. f. Fl. Nov. Zel.* i (1853) 236, *and* ii (1855) 336; *A. Bennett in Journ. Bot.* xxv (1887) 178; *Cheesem. Man. N.Z. Fl.* (1906) 750; *Ill. N.Z. Fl.* ii (1914) t. 207. P. gramineus *Hook. f. Handb. N.Z. Fl.* (1864) 279 (*not of Linn.*). P. obtusifolius *Benth. Fl. Austral.* vii (1878) 172 (*not of Mert. and Koch*).

North and South Islands: Rivers and lakes from the North Cape to Otago, not uncommon. November–March.

This is a much larger and stouter plant than the northern *P. obtusifolius*, to which it was referred by Bentham. It appears to be plentiful in Australia, ranging from Queensland to Tasmania.

5. **P. pectinatus** *Linn. Sp. Plant.* (1753) 127.—Stems long, filiform, much branched, often forming dense masses. Leaves all submerged, alternate, sheathing at the base, 2–4 in. long by $\frac{1}{20}$–$\frac{1}{15}$ in. broad, very narrow-linear or almost filiform, upper channelled on both surfaces, lower flatter, 1–3-nerved with transverse veinlets; stipules adnate with the sheathing base of the leaf. Peduncles long, slender, filiform, not thickened upwards; spike 1$\frac{1}{2}$–2 in. long, of distant whorls of flowers. Fruit rather large for the size of the plant, about $\frac{1}{8}$ in. long, turgid, obscurely keeled on the back, slightly convex in front, rugose when dry, beak very short.—*Hook. f. Fl. Nov. Zel.* ii (1855) 336; *Handb. N.Z. Fl.* (1864) 279; *Benth. Fl. Austral.* vii (1878) 173; *A. Bennett in Journ. Bot.* xxv (1887) 178; *Cheesem. Man. N.Z. Fl.* (1906) 750.

North Island: Auckland—Waikato River and Lake Whangape, *T. Kirk! T. F. C.;* Lakes Tarawera and Rotomahana, *T. Kirk!* mouth of Rangitikei River, Wellington, *Cockayne.* Hawke's Bay—Tangoia Lagoon, *Colenso, A. Hamilton!* Cape Turnagain, *B. C. Aston!* South Island: Canterbury—Lake Forsyth, *T. Kirk!* Otago—Lake Waihola, and still waters of the Taieri Plain, *Petrie!* December–March.

A very widely distributed plant, found in fresh or brackish waters in most parts of the world. It has a local distribution in New Zealand, and, although abundant in some localities, is absent from wide stretches of apparently suitable stations.

3. **RUPPIA** Linn.

Slender submerged much-branched herbs, usually growing in brackish water. Leaves alternate or opposite, filiform, with broad sheathing bases. Flowers minute, hermaphrodite, 2 or more on a spike, at first enclosed in the membranous leaf-sheath, but after flowering the filiform peduncle elongates greatly, and is either straight or spirally coiled. Perianth wanting. Stamens 2, opposite; filaments very short; anthers 2-celled, the cells distinct, opening outwards. Carpels 4; stigma sessile, peltate; ovule solitary, pendulous from the apex of the cell. Fruiting carpels stipitate, obliquely ovoid, obtuse or beaked. Seed uncinate; testa membranous; embryo with a large thick radicle and small incurved cotyledon.

A genus of either one variable species or of several closely allied ones, common in brackish waters in almost all temperate or subtropical countries.

1. **R. maritima** *Linn. Sp. Plant.* (1753) 127.—Stems slender, filiform, variable in length, 6–24 in., leafy throughout. Leaves 2–5 in. long, filiform, with broad membranous sheathing bases. Flowers 2–6 together, at first completely enclosed in the inflated leaf-sheath; but the spike gradually emerges, and is borne up to the surface of the water by the usually conspicuously spirally coiled peduncle. Ripe carpels $\frac{1}{10}$–$\frac{1}{8}$ in. long, greenish, obliquely ovoid, beaked; each one on a slender stipes sometimes more than 1 in. long.—*Hook. f. Fl. Nov. Zel.* i (1853) 236; *Handb. N.Z. Fl.* (1864) 279; *Benth. Fl. Austral.* vii (1878) 174; *Cheesem. Man. N.Z. Fl.* (1906) 751.

North and South Islands: Abundant throughout in brackish-water ponds and lagoons, not so common in fresh-water lakes and streams. December–April.

All the specimens I have seen have spirally coiled peduncles and rather broad sheaths; but in all probability the variety (or species) *rostellata* will also be found, which has straight or flexuous peduncles and narrow leaf-sheaths.

4. ZANNICHELLIA Linn. 1735.

Slender submerged water-plants; stems filiform, branched. Leaves usually opposite, filiform, sheathing at the base; sheaths stipular. Flowers [illegible] monoecious, a single male and female enclosed in the

Zannichellia palustris L.,

= (Lepilaena preissii, F. Muell.)

T.N.Z.I. vol. 53, p. 363.

bent into a short coil.

An almost cosmopolitan genus of 4 or 5 closely allied species, probably all forms of one.

1. **Z. palustris** *Linn. Sp. Plant.* (1753) 969.—Stems very slender, much branched, leafy throughout, often forming dense masses, 3–14 in. long. Leaves opposite or subwhorled, very slender, $\frac{1}{2}$–3 in. long, filiform, flat. Flowers sessile or very shortly pedicelled. Fruiting carpels 3 or 4, about $\frac{1}{12}$ in. long, stipitate or almost sessile, curved, smooth or very obscurely crenate on the back; styles from $\frac{1}{2}$ to almost as long as the carpels.—*Hook. f. Fl. Nov. Zel.* i (1853) 237; *Handb. N.Z. Fl.* (1864) 280; *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 498; *Cheesem. Man. N.Z. Fl.* (1906) 752.

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The Waikato specimens have the carpels sessile or nearly so, and decidedly turgid; in those from Hawke's Bay and Otago they are distinctly stipitate, and with longer styles. Both forms have the back of the carpel smooth or nearly so.

Ann Sc. Nat. 2 t. 18 (1842) 117.

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Althenia preissii (Lehm.) Graeb.

5. **LEPILAENA** J. Drummond. 1855.

Very slender submerged water-plants ; stems filiform, branched. Leaves alternate or the floral ones opposite, filiform, sheathing at the base ; sheaths broad, stipular. Flowers minute, axillary, dioecious or rarely monoecious, solitary within the dilated sheathing bases of a pair of floral leaves. Male flowers shortly pedicelled. Perianth very minute, of 3 hyaline scales. Anthers 2 or 3, united by their backs and forming a solid column resembling a single anther ; each anther 2-celled, dehiscing longitudinally. Female flowers sessile or shortly pedicellate. Perianth of 3 hyaline segments longer or shorter than the carpels. Carpels 3, distinct, sessile or shortly stipitate, narrowed into a short or long style ; stigma oblong or spathulate ; ovule solitary, pendulous. Ripe carpels usually 3, oblong, coriaceous, indehiscent, tipped by the persistent style. Seed oblong ; testa membranous ; embryo with a thick obtuse radicle and tapering involute cotyledonary end.

A small genus of 4 species, 3 of which are Australian, one of them said to extend to New Zealand ; the remaining one is endemic in New Zealand. In Engler's "Naturlichen Pflanzenfamilien" the genus is merged with the Mediterranean *Althenia*.

Leaf-sheaths narrow. Anthers 3, connate into a column. Stigma oblong-clavate .. .. 1. *L. Preissii.*

Leaf-sheaths broad. Anthers 2 (or 1 ?). Stigma very large, flat, deeply fimbriate .. .. 2. *L. bilocularis.*

1. **L. Preissii** *F. Muell. Fragm. Phyt. Austral.* viii, 217.—Stems 6–18 in. long, very slender, filiform, branched, often forming dense masses. Leaves filiform or almost capillary ; sheathing bases very narrow. Flowers dioecious ; males solitary within the leaf-sheaths, shortly pedicelled. Perianth minute, cupular. Anthers 3, sessile within the perianth, connate by their backs into a columnar mass, each one 2-celled, cells dehiscing longitudinally. Female flowers solitary, shortly pedicelled. Perianth of 3 distinct segments, rather longer than the carpels. Carpels 3, narrowed into a rather long style ; stigma oblong-clavate. Ripe carpels cylindrical, sessile or nearly so, about ½ in. long.—*Benth. Fl. Austral.* vii (1878) 180 ; *T. Kirk in Trans. N.Z. Inst.* x (1878) App. 40, *and* xxviii (1896) 499 ; *Cheesem. Man. N.Z. Fl.* (1906) 753. Zannichellia Preissii *Lehm. in Plant. Preiss,* ii (1846–48) 3.

North Island : Auckland—Waikato River, near Churchill, *T. Kirk.*

I have seen no New Zealand specimens of this, but according to Mr. Kirk examples collected by him in the locality quoted above were submitted to the late Baron Mueller and by him identified with the Australian *L. Preissii.* It greatly resembles *Zannichellia palustris,* and in the absence of male flowers may have been mistaken for it.

N.Z. Country Journal 2 (1885) 377.

2. **L. bilocularis** *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 500.—Stems filiform, much branched, 3–12 in. long. Leaves very narrow-linear or filiform, flat, 1-nerved, obtuse ; base broad, expanded into a membranous sheath. Flowers very minute, solitary, dioecious, concealed in the leaf-sheaths. In the male plant the sheathing bases of the floral leaves are broad and much expanded, and conspicuously 2-lobed at the tip. Flowers very shortly pedicelled. Perianth of 3 most minute hyaline scales. Anthers apparently 2, cohering by their backs and resembling a single anther, each 2-celled, longitudinally dehiscent, connective produced. Floral leaves subtending the female flowers with narrower sheaths ; flowers

sessile or very shortly pedicelled. Perianth-segments 3, oblong, entire or 2-lobed, almost as long as the styles. Carpels 3, sessile; styles slender; stigmas very large and broad, deeply fimbriate or laciniate. Ripe carpels about $\frac{1}{15}$ in. long, slightly oblique, turgid, rounded on the back; style almost as long as the carpel.—*Cheesem. Man. N.Z. Fl.* (1906) 753.

N. Island: Tolaga Bay V.U. Cotor. see Allan Vol 65 Trans. p. 231

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A very curious little plant. Mr. Kirk describes the anthers as solitary; but in Mr. Petrie's Lake Waihola specimens, which are the only males that I have seen, I make the anthers to be 2, placed back to back, but closely resembling a single 4-celled anther. At the same time it is not easy to satisfy oneself as to the structure of the anther from an examination of dried specimens.

see also Bot. Tidsskrift. 31 (1909) 32.

6. **ZOSTERA** Linn. 1741.

Marine submerged plants. Rhizomes slender, branched, creeping and rooting at the nodes, often matted. Stems short, slender, leafy, compressed. Leaves distichous, alternate, narrow-linear, grass-like, 1–5-nerved, sheathing at the base; sheaths stipuliform, with inflexed margins. Flowers monoecious, the males and females placed alternately upon one face of a narrow spadix enclosed within the dilated membranous base of a leaf. Perianth wanting. Male flowers: Anther solitary, sessile, oblong, cylindric, curved, 1-celled; dehiscence longitudinal; pollen confervoid. Female flowers: Carpel solitary, laterally attached above the middle, narrowed into a short subulate style; stigmas 2, capillary; ovule pendulous from the apex of the cell. Ripe carpel oblong, membranous, bursting irregularly. Seed pendulous; testa membranous, often striated; embryo large, deeply grooved, the linear incurved cotyledonary end sunk in the groove.

Three or four closely allied species are known, found in shallow water on the shores of most temperate regions.

Z. muelleri

Lepilaena bilocularis, T. Kirk

a. capricorni

= Althenia bilocularis (T. Kirk) Ckn.

see Nat. History of Canterbury 1927.

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North and South Islands, Stewart Island: Muddy and sandy shores throughout, usually between high- and low-water marks. Widely distributed in temperate seas.

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5. **LEPILAENA** J. Drummond. 1855.

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I [illegible] collecte[illegible] Muelle[illegible] *Zannic[illegible]* for it.

2. Stems [illegible] or filiform, [illegible] branous sheath. Flowers very minute, solitary, dioecious, concealed in the leaf-sheaths. In the male plant the sheathing bases of the floral leaves are broad and much expanded, and conspicuously 2-lobed at the tip. Flowers very shortly pedicelled. Perianth of 3 most minute hyaline scales. Anthers apparently 2, cohering by their backs and resembling a single anther, each 2-celled, longitudinally dehiscent, connective produced. Floral leaves subtending the female flowers with narrower sheaths; flowers

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Three or four closely allied species are known, found in shallow water on the shores of most temperate regions.

Leaves 3–9 in. × $\frac{1}{16}$–$\frac{1}{10}$ in., truncate or notched at the tip. Spadix with transverse appendages, one folded over each carpel .. 1. *Z. nana.*

Leaves 9–18 in. × $\frac{1}{10}$ in.–$\frac{1}{6}$ in., rounded at the tip .. .. 2. *Z. tasmanica.*

1. **Z. nana** *Roth Enum. Pl. Phaen. Germ.* i (1827) 8. — Rhizomes slender, matted. Leaves 3–9 in. long, rarely more, $\frac{1}{16}$–$\frac{1}{10}$ in. broad, narrow-linear, truncate or obscurely notched at the tip, with 3–5 faint parallel nerves on each side of the stout midrib and distant transverse veinlets, margins thickened. Floral sheaths or spathes $\frac{1}{2}$–1 in. long, on peduncles of equal length, the blade of the leaf continued above the sheath, the sheath itself much wider than the blade. Spadix 6–12-flowered, its margins with transverse membranous appendages folded inwards, one over each carpel. Stigmas usually protruding through the slit of the spathe. Fruit about $\frac{1}{10}$ in. long, oblong, obscurely striate.—*Benth. Fl. Austral.* vii (1878) 176; *T. Kirk in Trans. N.Z. Inst.* x (1878) 392; *Cheesem. Man. N.Z. Fl.* (1906) 754. Z. Muelleri *Irmisch ex Aschers. in Linnaea,* xxxv (1867–68) 168.

North and South Islands, Stewart Island: Muddy and sandy shores throughout, usually between high- and low-water marks. Widely distributed in temperate seas.

2. **Z. tasmanica** *Martens ex Aschers. in Linnaea,* xxxv (1867–68) 168 (?).—Rhizomes slender, wide-creeping. Leaves 9–18 in. long, $\frac{1}{10}$–$\frac{1}{6}$ in. broad, narrow-linear, rounded at the tip, not truncate, with 1–3 stout nerves on each side of the midrib and several finer ones between, cross-veinlets distant. Flowers and fruit not seen.—*Cheesem. Man. N.Z. Fl.* (1906) 754. Z. marina *Hook. f. Handb. N.Z. Fl.* (1864) 742 (*not of Linn.*).

North and South Islands: Not uncommon in sandy or muddy places along the coasts, often in water of considerable depth.

The exact position of the New Zealand plant must remain doubtful until the fructification has been obtained, but it is probably the same as the Australian and Tasmanian *Z. tasmanica*, which seems hardly different from narrow-leaved forms of the northern *Z. marina.*

See Hubbard in Hutch. 1934.

Family XII. **GRAMINEAE.**

Annual or perennial, erect or creeping herbs, rarely (bamboos) shrubby or arborescent. Stem (*culm*) branched at the base, cylindrical or slightly compressed, jointed, generally hollow between the joints; joints (*nodes*) solid, swollen. Leaves alternate, distichous, usually long and narrow, entire, parallel-veined; sheath long, split to the base on one side, at its junction with the blade usually furnished with an erect membranous appendage called the *ligule*. Flowers hermaphrodite or unisexual, minute, solitary in the axils of small bracts (*glumes*) which are imbricated in 2 opposite rows, forming little spikes or *spikelets*. Spikelets usually many, arranged in spikes, panicles, or fascicles. Glumes placed alternately on each side of the axis (*rhachilla*) of the spikelet, the first or lowest 1–6 (commonly the first 2) empty and known as *empty glumes* or *outer glumes*, or simply as glumes. The succeeding 1 or several are called *flowering glumes*, each of them having in its axil a very short branchlet bearing on its upper side a 2-nerved bractlet called the *palea;* the branchlet ending in a flower, which is thus enclosed by the flowering glume and palea. Occasionally 1 or more glumes at the top of the spikelet are empty or enclose rudimentary flowers only. Perianth wanting, unless represented by 2 (rarely 3) minute scales (*lodicules*). Stamens usually 3, rarely 1, 2, or 6, hypogynous; filaments capillary; anthers pendulous, versatile, fugacious. Ovary 1-celled; styles 2 or rarely 3, free or connate at the base, feathery with simple or branched stigmatic hairs; ovule solitary, erect, anatropous. Fruit a seed-like utricle or grain (*caryopsis*) either free within the flowering glume and palea, or adhering to one or both. Seed erect, usually adherent to the membranous pericarp, rarely separable (*Sporobolus*); albumen copious, farinaceous; embryo very small, roundish, on one side of the base of the albumen.

One of the largest of the families of plants, found in all climates and situations, but most numerous in temperate regions. Genera about 325; species probably not less than 3500. In usefulness to man it is exceeded by no other family. The nutritious herbage forms the chief pasturage of our flocks and herds; the cereal grains, as wheat, barley, rye, oats, rice, millet, maize, &c., constitute a very large proportion of our food; sugar is obtained from the sugar-cane and sorghum; while few plants are applied to a greater variety of uses than the various kinds of bamboos. Many species are cultivated for ornamental purposes, from the dwarf varieties used for edgings and lawns to the pampas-grass and giant-bamboo. Of the 33 indigenous genera, one only (*Simplicia*) is endemic; 4 (*Microlaena, Echinopogon, Dichelachne,* and *Amphibromus*) are found elsewhere in Australia and Tasmania alone; and 2 others (*Ehrharta* and

Armstrong J.B. a short history of grasses
N.Z. Country Journal.
Vol 4 (1880) 64–343
5 (1881) 54–65 & 124–126,

Asperella) have a very restricted range, but are not indigenous in Australia. The remaining 26 are widely distributed in either temperate or tropical regions or in both, and some are cosmopolitan. In addition to the indigenous species, a large number of grasses have become naturalized, and every year adds to the list. Most of these are natives of the Northern Hemisphere, and many have been purposely introduced and widely spread through the country on account of their value for pasturage or fodder. The remainder are either weeds of cultivation or inhabitants of waste-places or roadsides, a large proportion having followed the footsteps of civilized man all round the world. A few Australian and subtropical species have also established themselves, but the number of these is not nearly so large as might have been anticipated. Many of the naturalized species have so completely amalgamated with the indigenous flora as to present all the appearance of true natives, and will certainly be taken as such by a beginner unacquainted with their history. It will therefore be advisable, when determining any species, to make frequent reference to the list of naturalized species given in another part of this work, and to become acquainted with their distinguishing characters, which, in the majority of cases, can be learned from any British Flora.

In preparing the first edition of this work I was greatly indebted to Professor E. Hackel, of Graz, Austria, so well known for his wide acquaintance with the family, for undertaking a critical examination of the whole of the New Zealand species then known, and for furnishing me with very full and complete notes, with permission to use the same. In the arrangement then given I largely followed his recommendations, and I find little reason to depart from them when once more revising the family.

Division A. PANICACAE.

Spikelets articulated on their pedicels below the glumes and falling away at maturity; usually 2-flowered, the upper flower perfect and producing seed, the lower flower always male; rhachilla not continued beyond the upper flower.

Tribe I. ANDROPOGONEAE.

Spikelets usually 1-flowered, generally in pairs, rarely in threes or solitary, on the rhachis of a spike or branches of a panicle, all hermaphrodite or some of them male, in the latter case so placed that a male spikelet stands by the side of a hermaphrodite one. Flowering glumes hyaline, often awned, usually much smaller than the empty ones.

Panicle long, dense, cylindrical. Spikelets awnless, almost concealed by long silky hairs .. .. 1. Imperata.

Tribe II. ZOYSIEAE.

Spikelets usually 1-flowered, solitary or in clusters on the rhachis of a spike or raceme. Flowering glumes membranous, never awned, usually smaller than the outer glumes.

Small creeping usually maritime grass. Leaves short, rigid. Spike short, stiff. Spikelets appressed to the rhachis .. .. 2. Zoysia.

Tribe III. PANICEAE.

Spikelets with 1 terminal hermaphrodite flower with or without a male one below it. Flowering glumes awnless, cartilaginous or coriaceous, in fruit hardened and enclosing the grain. Outer glumes thinner in texture than the flowering glumes, rarely awned.

Spikelets 1-flowered, plano-convex, sessile in 2 or 4 rows in one-sided spikes which are either in pairs or form the branches of a simple panicle. Empty glumes 2 .. .. 3. Paspalum.

Spikelets with 2 hermaphrodite flowers, panicled; outer glumes 2, persistent after the rest of the spikelet has fallen away .. 4. Isachne.

Spikelets with 1 hermaphrodite flower and sometimes a male flower below; outer glumes 2 or 3, not awned, the lowest often very small .. .. 5. PANICUM.
Stems weak, decumbent; leaves broad, ovate to lanceolate. Spikelets as in *Panicum*, but outer glumes awned .. .. 6. OPLISMENUS.
Spikelets enclosed, each one or 2-3 together, in an involucre of rigid spines or bristles, often connate into a cup below .. 7. CENCHRUS.
Stout wide-creeping sand-plant. Inflorescence dioecious; males in spikes clustered in heads; females in dense globular heads with long radiating pungent-pointed bracts .. .. 8. SPINIFEX.

DIVISION B. POACEAE.

Spikelets not articulated on the pedicel below the glumes, the rhachilla continuous with the pedicel, and the articulations above the outer glumes and frequently also between the flowering glumes. Flowers 1 to many, the lowest flower perfect, the uppermost often male or imperfect. (Lower flower imperfect in *Phalarideae*.)

TRIBE IV. PHALARIDEAE.

Spikelets with 1 terminal hermaphrodite flower, with or without 1 or 2 male or rudimentary flowers below. Outer glumes 4, the lower 2 sometimes small, the 2 inner sometimes serving as flowering glumes for male flowers.

First and second outer glumes smaller than the third and fourth. Flowering glumes obtuse .. .. 9. EHRHARTA.
First and second outer glumes minute, many times smaller than the third and fourth. Flowering glumes acute .. .. 10. MICROLAENA.
First and second outer glumes as large as the third and fourth, both of which usually contain a male flower .. .. 11. HIEROCHLOE.

TRIBE V. AGROSTIDEAE.

Spikelets 1-flowered; rhachilla frequently produced beyond the flower. Outer glumes 2, usually as long or longer than the flowering glume.

Spikelets panicled. Outer glumes usually longer than the flowering, which are rigid and convolute and awned. Awn long, terminal, bent, usually twisted below the bend .. .. 12. STIPA.
Panicle short and dense, cylindrical, bristly from the long awns. Flowering glume hyaline, 3-fid, middle lobe produced into a long awn. Rhachilla evidently produced .. .. .. 13. ECHINOPOGON.
Panicle dense, cylindrical. Outer glumes compressed, fringed on the keel. Flowering glume hyaline, with a short dorsal awn. Rhachilla not produced .. .. 14. ALOPECURUS.
Panicle long, narrow and spike-like in the New Zealand species. Spikelets small, awnless. Flowering glume usually exceeding the outer glumes. Seed loose in the pericarp and finally expelled from it .. .. 15. SPOROBOLUS.
Spikelets panicled. Outer glumes very minute. Flowering glume awnless, acuminate, pubescent. Palea almost as long as the glume .. .. 16. SIMPLICIA.
Spikelets small, panicled. Flowering glume hyaline, much smaller than the outer glumes, awned on the back or awnless. Palea usually short, often minute or wanting. Rhachilla not produced 17. AGROSTIS.
Spikelets small, panicled. Flowering glume hyaline, smaller than the outer glumes or almost equalling them, awned on the back. Palea more than half as long as the flowering glume. Rhachilla produced beyond the palea, silky .. .. 18. DEYEUXIA.
Panicle long, narrow, dense, bristly from the long awns. Flowering glume hardly shorter than the outer glumes, with a long and fine awn from the back near the tip .. .. .. 19. DICHELACHNE.

Tribe VI. AVENAE.

Spikelets 2- or several-flowered, usually panicled. Flowering glumes generally shorter than the outer glumes, usually awned; awn geniculate and often twisted, rarely straight.

* Awn of the flowering glumes dorsal, rising from below the terminal teeth of the glume, not from between them.

Spikelets 2-flowered. Flowering glumes erose or 2-toothed at the tip, shortly awned .. .. 20. Deschampsia.
Spikelets 2–6-flowered. Flowering glumes sharply 2-toothed at the tip; teeth sometimes almost awned; awn from the back just below the teeth .. .. 21. Trisetum.
Spikelets 5–10-flowered. Flowering glumes rounded at the back; awn dorsal, straight or bent .. .. 22. Amphibromus.

** Awn of the flowering glumes rising from between the terminal lobes or teeth of the glume.

Spikelets several-flowered. Flowering glumes rounded at the back, often ciliate or hairy; awn rigid, often twisted or flattened at the base .. .. 23. Danthonia.

Tribe VII. CHLORIDEAE.

Spikelets 1-many-flowered, crowded in two rows on one side of a flat rhachis or spike; spikes in racemes or digitate.

Spikes digitate or scattered at the top of the culm. Spikelets compressed, several-flowered, awnless. Outer glumes persistent; flowering glumes deciduous .. .. 24. Eleusine.

Tribe VIII. FESTUCEAE.

Spikelets 2-many-flowered, usually panicled or racemed. Flowering glumes generally exceeding the outer glumes, awnless or with 1 or several straight awns, which are usually terminal, rarely dorsal. Rhachilla produced beyond the uppermost flower.

Tall reed-like grasses with silvery panicles. Flowering glumes covered with long hairs, membranous. Rhachilla long, glabrous 25. Arundo.
Spikelets 3–5-flowered, usually rounded on the back. Flowering glumes 2–3-toothed, middle tooth often mucroniform or slightly awned .. .. 26. Triodia.
Panicle spiciform. Spikelets 2–5-flowered, shining, compressed. Flowering glumes scarious, mucronate or shortly awned .. 27. Koeleria.
Spikelets 2-many-flowered, compressed. Flowering glumes keeled at the back, acute or obtuse, awnless, often (together with the rhachilla) clothed at the base with tangled hairs. Hilum punctiform .. .. 28. Poa.
Spikelets 3-many-flowered. Flowering glumes rounded at the back, obtuse, awnless, 5–9-nerved. Lodicules distinct. Hilum punctiform .. .. 29. Atropis.
Spikelets 2-many-flowered. Flowering glumes rounded on the back, more rigid than in *Poa*, acute or awned. Ovary naked or hairy. Hilum long, linear .. .. 30. Festuca.
Spikelets 3-many-flowered. Flowering glumes rounded on the back or slightly keeled, mucronate or awned, 5–9-nerved. Ovary villous at the top .. .. 31. Bromus.

Tribe IX. HORDEAE.

Spikelets 1-many-flowered, sessile in alternate notches on opposite sides of the rhachis of a simple spike, either solitary or several together. Glumes awned or not.

Spikelets solitary in the notches of the rhachis, 2-many-flowered, placed flatwise on the rhachis. Outer glumes conspicuous .. 32. Agropyrum.
Spikelets solitary (or in non-New-Zealand species in pairs) at the notches of the rhachis, 2–4-flowered, placed flatwise on the rhachis. Empty glumes either wanting or reduced to 2 small bristles .. .. 33. Asperella.

1. **IMPERATA** Cyr.

Tall erect perennial grasses. Leaves long. Panicles long, terminal, densely spiciform or narrow-thyrsiform, silky-silvery. Spikelets all similar, numerous, densely clothed with long silky hairs, usually arranged in pairs on the continuous branches of the panicle, one sessile or almost so, the other distinctly stalked, all 1-flowered. Empty glumes 3, subequal, narrow, membranous, awnless, 3–9-nerved, the 2 outer clothed with long hairs. Flowering glume usually much smaller, hyaline. Palea small, broad, hyaline, nerveless. Lodicules wanting. Stamens 1 or 2. Stigma long, exserted from the tip of the spikelet. Grain oblong, with an embryo half its length or more.

A genus of about 6 species, found in the tropical or warm temperate regions of both hemispheres. One of the New Zealand species is very widely diffused, the other is endemic in the Kermadec Islands.

Panicle densely spiciform, cylindric, obtuse, shining. Stamens 2.. 1. *I. arundinacea.*

Panicle not so dense, narrow-lanceolate, acuminate, not shining.
Stamen 1 .. .. 2. *I. Cheesemanii.*

I. cylindrica (L.) Beauv. - var K. (Benth.) Druce 1916 P. 128.

1. **I. arundinacea** *Cyr. Pl. Rar. Ic.* ii (1792) 26, t. 11; var. **Koenigii** *Benth. Fl. Hongk.* 419.—Culms 1–3 ft. high, slender, erect, glabrous, 3–4-noded. Leaves erect, narrow, often exceeding the culms; sheaths rather loose, with a dense erect tuft of hairs at the nodes; ligules short, membranous, truncate; laminae linear from a very narrow base, acuminate, rather rigid, flat or convolute; margins scabrid; midrib stout. Panicle densely spiciform, 3–6 in. long, cylindric, obtuse, silvery-white and shining from the long and silky hairs which conceal the glumes; branchlets very numerous, appressed; pedicels capillary or setaceous, clavate at the apex. Spikelets about $\frac{1}{6}$ in. long, completely enveloped by fine silky hairs $\frac{1}{3}$ in. long. Empty glumes ovate-lanceolate, obtuse or subacute, hyaline, 5–7-nerved or the uppermost nerveless. Flowering glume $\frac{1}{3}$–$\frac{1}{2}$ as long as the upper empty glume, ovate, acute, glabrous, hyaline, nerveless. Palea about $\frac{1}{2}$ as long as the glume, quadrate, truncate, nerveless. Stamens 2. Stigmas long, purple.—*Hack. in D.C. Monog. Phan.* vi, 94; *Stapf. in Fl. Capen.* vii (1898) 321.

North Island: Auckland—Near Kaitaia, *R. H. Matthews!*

Perhaps introduced only, but it is one of those species which might be expected to be indigenous in the extreme north of the Dominion, and I have consequently given it the benefit of the doubt. The species, in some of its forms, is found in all warm countries; var. *Koenigii* is common throughout Africa, and in Australia and Tasmania, stretching northwards to India, China, and Japan.

2. **I. Cheesemanii** *Hack. in Trans. N.Z. Inst.* xxxv (1903) 378.—Perennial, innovation-shoots extravaginal. Culms 1–3 ft. high, simple, stout, erect, glabrous, 3-noded. Leaves numerous, rather shorter than the culms; sheaths loose, bearded at the mouth but otherwise glabrous, the uppermost sheathing the base of the panicle, the lowest scale-like; ligules short, truncate, membranous; laminae linear from a narrow base, acute or acuminate, $\frac{1}{2}$–$\frac{3}{4}$ in. broad, flat, nerved, glabrous; margins scabrid above. Panicle narrow-lanceolate, gradually narrowed upwards into an acute point, 5–10 in. long, $\frac{3}{4}$–$1\frac{1}{4}$ in. broad, dense but not so much so as in *I. arundinacea*, greyish-white with long soft hairs that conceal the glumes, not shining; branches numerous, erecto-patent, flexuose, simple or with short branchlets in the lower half, pedicels clavate above. Spikelets about

$\frac{1}{8}$ in. long, enveloped by long soft hairs $\frac{1}{4}$–$\frac{1}{3}$ in. long. Outer glume as long as the spikelet, lanceolate, subacute, membranous, obscurely 5-nerved, laxly pilose along the back, ciliolate at the apex; the 2nd similar but 3-nerved; 3rd $\frac{1}{3}$ shorter, broadly ovate, obtuse, hyaline, nerveless. Flowering glume $\frac{1}{3}$ shorter than the outer empty glumes, ovate, acuminate, tridentate, hyaline, nerveless. Palea broad, truncate, fimbriate-ciliate. Stamen 1. Stigmas long, purple.—I. arundinacea *Cheesem. in Trans. N.Z. Inst.* xx (1888) 175 (*not of Cyr.*); *Man. N.Z. Fl.* (1906) 843; *Ill. N.Z. Fl.* ii (1914) t. 218.

KERMADEC ISLANDS: Cliffs on the north side of Sunday Island, abundant. *T. F. C., Miss Shakespear! W. R. B. Oliver!*

Closely allied to *I. exaltata* Brong., but a much smaller plant, with a smaller and less branched panicle, larger and broader spikelets on more clavate pedicels, and with the outer glume 5-nerved.

2. **ZOYSIA** Willd.

Small perennial creeping grasses. Culms branched at the base, rigid, erect. Leaves distichous, subulate, often pungent-pointed. Spikelets few, ovoid, 1-flowered, sessile or shortly pedicelled, not distichous, jointed on and closely appressed along a rigid notched unjointed rhachis, forming a short spike. Glumes 2, [illegible]

[illegible] rhizome long, creeping, branched, rigid and wiry. Culms numerous from the rhizome, often branched at the base, erect, rigid, glabrous, usually from 1 to 3 in. high, but sometimes taller and attaining 4–6 in. or even more. Leaves more or less spreading, subulate, flat or convolute, coriaceous; sheaths short, grooved, tipped with a few cilia; ligule wanting. Spike terminal, $\frac{1}{8}$–$\frac{3}{4}$ in. long; spikelets usually 3–5, but in small specimens often reduced to one, and in large ones sometimes as many as 7–9. Outer glume smooth and shining, convolute, coriaceous, tip often produced into a short awn. Flowering glume thin and hyaline, included within the outer glume.—*Hook. f. Fl. Nov. Zel.* i (1853) 312; *Handb. N.Z. Fl.* (1864) 324; *Benth. Fl. Austral.* vii (1878) 506; *Buch. N.Z. Grasses* (1879) t. 13A; *Cheesem. Man. N.Z. Fl.* (1906) 844. Rottboella uniflora *A. Cunn. Precur.* (1836) n. 267; *Raoul Choix* (1846) 39.

NORTH AND SOUTH ISLANDS: Abundant on sandy shores from the North Cape to Banks Peninsula and Okarito, less common in dry places inland, ascending to 2000 ft. at Lake Taupo and in Canterbury and Otago. Also not uncommon on the shores of Australia and Tasmania, extending northwards to India, Malacca, and China.

3. **PASPALUM** Linn.

Annual or perennial grasses, of various habit. Spikelets 1-flowered, orbicular or oblong, obtuse or rarely acute, not awned, sessile or very shortly pedicelled, arranged in one or two rows on one side of a slender

1. **IMPERATA** Cyr.

Tall erect perennial grasses. Leaves long. Panicles long, terminal, densely spiciform or narrow-thyrsiform, silky-silvery. Spikelets all similar, numerous, densely clothed with long silky hairs, usually arranged in pairs on the continuous branches of the panicle, one sessile or almost so, the other distinctly stalked, all 1-flowered. Empty glumes 3, subequal, narrow, membranous, awnless, 3–9-nerved, the 2 outer clothed with long hairs. Flowering glume usually much smaller, hyaline. Palea small, broad, hyaline, nerveless. Lodicules wanting. Stamens 1 or 2. Stigma long, exserted from the tip of the spikelet. Grain oblong, with an embryo half its length or more.

A genus of about 6 species, found in the tropical or warm temperate regions of both hemispheres. One of the New Zealand species is very widely diffused, the other is endemic in the Kermadec Islands.

Panicle densely spiciform, cylindric, obtuse, shining. Stamens 2.. 1. *I. arundinacea.*

Panicle not so dense, narrow-lanceolate, acuminate, not shining.
Stamen 1 .. .. 2. *I. Cheesemanii.*

I. cylindrica (L.) Beauv. - Var K. (Benth.) Druce 1916 P. 128

1. **I. arundinacea** *Cyr. Pl. Rar. Ic.* ii (1792) 26, t. 11; var. **Koenigii** [illegible] slender, erect, glabrous, 3–4-

Imperata arundinacea, var. Koenigii, Benth.
not native to N.Z. see T.N.Z.I.
vol. 57, p. 65. (Ckn. & Allan).

or the uppermost nerveless. Flowering glume [illegible] as long as the [illegible] empty glume, ovate, acute, glabrous, hyaline, nerveless. Palea about $\frac{1}{2}$ as long as the glume, quadrate, truncate, nerveless. Stamens 2. Stigmas long, purple.—*Hack. in D.C. Monog. Phan.* vi, 94; *Stapf. in Fl. Capen.* vii (1898) 321.

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$\frac{1}{8}$ in. long, enveloped by long soft hairs $\frac{1}{4}$–$\frac{1}{3}$ in. long. Outer glume as long as the spikelet, lanceolate, subacute, membranous, obscurely 5-nerved, laxly pilose along the back, ciliolate at the apex; the 2nd similar but 3-nerved; 3rd $\frac{1}{3}$ shorter, broadly ovate, obtuse, hyaline, nerveless. Flowering glume $\frac{1}{3}$ shorter than the outer empty glumes, ovate, acuminate, tridentate, hyaline, nerveless. Palea broad, truncate, fimbriate-ciliate. Stamen 1. Stigmas long, purple.—I. arundinacea *Cheesem. in Trans. N.Z. Inst.* xx (1888) 175 (*not of Cyr.*); *Man. N.Z. Fl.* (1906) 843; *Ill. N.Z. Fl.* ii (1914) t. 218.

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2. **ZOYSIA** Willd.

Small perennial creeping grasses. Culms branched at the base, rigid, erect. Leaves distichous, subulate, often pungent-pointed. Spikelets few, ovoid, 1-flowered, sessile or shortly pedicelled, not distichous, jointed on and closely appressed along a rigid notched unjointed rhachis, forming a short spike. Glumes 2; the outer one empty, broad, convolute, coriaceous, shining and nerveless; the inner flowering one included within the outer and much smaller than it, membranous, hyaline. Palea still smaller, short, nerveless, hyaline, sometimes wanting. Lodicules wanting. Stamens 3. Styles long, distinct; stigmas elongate. Grain free, enclosed within the hardened outer glume.

A small genus of 2 or 3 closely related species, found on the shores of southern and eastern Asia, Mauritius, Australia, and New Zealand.

1. **Z. pungens** *Willd. in Ges. Naturf. Fr. Neue Schr.* iii (1801) 441.—Rhizome long, creeping, branched, rigid and wiry. Culms numerous from the rhizome, often branched at the base, erect, rigid, glabrous, usually from 1 to 3 in. high, but sometimes taller and attaining 4–6 in. or even more. Leaves more or less spreading, subulate, flat or convolute, coriaceous; sheaths short, grooved, tipped with a few cilia; ligule wanting. Spike terminal, $\frac{1}{8}$–$\frac{3}{4}$ in. long; spikelets usually 3–5, but in small specimens often reduced to one, and in large ones sometimes as many as 7–9. Outer glume smooth and shining, convolute, coriaceous, tip often produced into a short awn. Flowering glume thin and hyaline, included within the outer glume.—*Hook. f. Fl. Nov. Zel.* i (1853) 312; *Handb. N.Z. Fl.* (1864) 324; *Benth. Fl. Austral.* vii (1878) 506; *Buch. N.Z. Grasses* (1879) t. 13A; *Cheesem. Man. N.Z. Fl.* (1906) 844. Rottboella uniflora *A. Cunn. Precur.* (1836) n. 267; *Raoul Choix* (1846) 39.

NORTH AND SOUTH ISLANDS: Abundant on sandy shores from the North Cape to Banks Peninsula and Okarito, less common in dry places inland, ascending to 2000 ft. at Lake Taupo and in Canterbury and Otago. Also not uncommon on the shores of Australia and Tasmania, extending northwards to India, Malacca, and China.

3. **PASPALUM** Linn.

Annual or perennial grasses, of various habit. Spikelets 1-flowered, orbicular or oblong, obtuse or rarely acute, not awned, sessile or very shortly pedicelled, arranged in one or two rows on one side of a slender

spike; spikes solitary, binate, digitate, or panicled. Glumes 3; 2 outer empty, membranous, usually subequal or rarely the lowest smaller or absent; upper or flowering glume much firmer, cartilaginous or almost coriaceous, 5–7-nerved. Palea similar in texture to the flowering glume but rather smaller, 2-nerved. Lodicules 2, cuneate. Stamens 3. Styles 2, distinct to the base, rather long. Grain ovoid or oblong, free, enclosed within the hardened flowering glume and palea.

Species about 200, scattered through the tropics of both hemispheres, but most abundant in America. The three species found in New Zealand are widely distributed.

Rhizome not creeping. Culms usually erect, 1–3 ft. Spikelets orbicular-ovoid, obtuse .. .. 1. *P. scrobiculatum.*

Rhizome long, creeping. Culms ascending, 6–24 in. Leaves flat, $\frac{1}{6}$–$\frac{1}{3}$ in. broad. Lateral spikes sessile. Spikelets oblong-ovoid, acute .. .. 2. *P. Digitaria.*

Rhizome long, creeping. Culms ascending, 2–8 in. Leaves involute, $\frac{1}{12}$ in. broad. Spikes all peduncled. Spikelets oblong, acute .. 3. *P. distichum.*

1. **P. scrobiculatum** *Linn. Mant.* i (1771) 29.—Rhizome short. Culms tufted, erect or decumbent at the base, usually sheathed throughout by the leaves, glabrous, 1–3 ft. high. Leaves linear or linear-lanceolate, acute or acuminate, $\frac{1}{4}$–$\frac{1}{2}$ in. broad, glabrous or slightly hairy towards the base, flat or wrinkled; margins rough; ligule short, broad, membranous; sheaths rather lax. Spikes varying in number from 2 to 6, 1–2 in. long, alternate towards the top of the culm, usually rather distant, spreading or erect; rhachis $\frac{1}{12}$ in. broad, flat, margins ciliate. Spikelets in 2 or rarely 3–4 rows, imbricate, sessile or very shortly pedicelled, sometimes geminate on a common pedicel, ovoid-orbicular, obtuse, glabrous. Empty glumes subequal, thin and membranous, with a prominent midrib; the outer one with a single marginal vein on each side; the upper one with 2 marginal veins. Flowering glume similar in size and shape to the empty glumes, hard and coriaceous, brown, shining, minutely pitted. Palea coriaceous like the flowering glume, the margins produced into membranous inflected auricles.—*Hook. f. Fl. Nov. Zel.* i (1853) 291; *Handb. N.Z. Fl.* (1864) 323; *Benth. Fl. Austral.* vii (1878) 460; *Buch. N.Z. Grasses* (1879) t. 10A; *Cheesem. Man. N.Z. Fl.* (1906) 845. P. orbiculare *Forst. f. Prodr.* (1786) n. 35; *A. Rich. Fl. Nouv. Zel.* (1832) 140; *A. Cunn. Precur.* (1836) n. 266; *Raoul Choix* (1846) 39.

North Island: Auckland—Lowland stations from the North Cape to the East Cape and Taranaki, not uncommon.

An abundant plant in all warm countries outside America.

P. distichum L. Sp. 1816?

Ex. 2. **P. Digitaria** *Poir. Encycl. Suppl.* iv (1817) 316.—Rhizome long, branched, creeping and rooting. Culms erect or ascending, sheathed throughout by the leaves, glabrous, 6–24 in. high. Leaves numerous, distichous, 2–8 in. long, $\frac{1}{6}$–$\frac{1}{3}$ in. broad, flat, glabrous or sparingly hairy towards the base; ligules short, membranous, truncate; sheaths compressed, striate, margins pilose above. Spikes rather slender, 1–2 in. long, usually 2 but sometimes 3 or even 4, the lateral ones sessile or nearly so; rhachis flat, margins scabrid. Spikelets in 2 rows, nearly sessile, imbricate and appressed to the rhachis, ovate-oblong, acute, flattened, pale-green. Empty glumes equal, acute, membranous, pubescent or glabrous; the lower one 3-nerved; the upper 5-nerved, sometimes an additional minute empty glume is present at the base of the spikelet. Flowering glume coriaceous, smooth, shining,

L. Syst. Nat. Ed X 855 1759.

Muell. Bot. Zeit XIX 394 1861.

Ann. Bot. I.K.

Paspalum digitaria, Poir.

not native to N.Z. see T.N.Z.I. vol. 57, p. 66. (Ckn. & Allan).

Probably introduced into New Zealand, as in Australia, South Africa, India, and other countries, but the localities it affects give it the appearance of being indigenous. It is a common plant in many parts of America, from Virginia southwards. It can be distinguished from *P. distichum* by its greater size, much broader flat leaves, and by the lateral spikes being sessile.

P. vaginatum, Sw. See N. Am. Fl. 17(2). 1912. 95-6.

3. **P. distichum** *Linn. Syst. Nat.* (1759) 855.—Rhizome long, branched, creeping and rooting. Culms numerous, ascending, sheathed throughout by the leaves, glabrous, 2–8 in. high. Leaves numerous, distichous, 2–5 in. long by about $\frac{1}{12}$ in. broad, linear, acute, strict, spreading, usually involute; ligules short, truncate; sheaths thin, pale, loose, bearded at the mouth. Spikes 2, both peduncled and jointed on the top of the culm, usually spreading, 1–1½ in. long; rhachis narrower than the spikelets. Spikelets in 2 rows, sessile or nearly so, imbricate and appressed to the rhachis, oblong, acute or almost acuminate, flattened, glabrous, pale. Empty glumes equal, acute, thin and membranous, faintly 3–5-nerved. Flowering glume rather shorter than the empty glumes, coriaceous, pale, very indistinctly nerved. Palea coriaceous like the flowering glume, margins slightly auricled.—*Hook. f. Fl. Nov. Zel.* i (1853) 291; *Handb. N.Z. Fl.* (1864) 323; *Benth. Fl. Austral.* vii (1878) 460; *Buch. N.Z. Grasses* (1879) t. 10B; *Cheesem. Man. N.Z. Fl.* (1906) 846. Rottboellia uniflora (A. Cunn.) (1836) 371.

NORTH ISLAND: Auckland—Salt marshes from the North Cape to the Bay of Plenty and the Waikato River, abundant.

Widely distributed in all warm countries.

4. ISACHNE R. Br. 1810 Prodr 196.

Perennial or rarely annual grasses. Culms tufted, or decumbent or creeping at the base. Spikelets small or minute, loosely panicled, not at all or very obscurely articulate on the pedicels, 2-flowered; both flowers hermaphrodite, or the lower flower sometimes male, and the upper flower sometimes female. Empty glumes 2, subequal, persistent or separately deciduous, convex, membranous, awnless. Flowering glumes 2, rather smaller than the empty glumes, equal or the lower larger, convex or almost hemispherical, subcoriaceous. Palea as long as the flowering glume. Lodicules very minute. Stamens 3, rarely more. Grain free within the hardened glume and palea, generally falling away with them.

Species about 25, widely spread in most tropical or subtropical regions. The single New Zealand species ranges through Australia to India and China.

1. **I. australis** *R. Br. Prodr.* (1810) 196.—Culms slender, creeping or decumbent at the base, ascending above, glabrous or nearly so, 6–18 in. high. Leaves short, 2–6 in. long, $\frac{1}{6}$–$\frac{1}{4}$ in. broad, lanceolate or linear-lanceolate, acute, flat, minutely rough on both surfaces, margins scaberulous; sheaths smooth, ciliate at the mouth and on the margins above. Panicle erect, usually open, ovoid or pyramidal in outline, 2–4 in. long; branches numerous, sparingly divided, very slender, flexuose, minutely scaberulous. Spikelets all pedicelled, small, globose or nearly so, obtuse,

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Species about 200, scattered through the tropics of both hemispheres, but most abundant in America. The three species found in New Zealand are widely distributed.

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Rhizome long, creeping. Culms ascending, 6–24 in. Leaves flat, $\frac{1}{6}$–$\frac{1}{3}$ in. broad. Lateral spikes sessile. Spikelets oblong-ovoid, acute .. .. 2. *P. Digitaria.*

Rhizome long, creeping. Culms ascending, 2–8 in. Leaves involute, $\frac{1}{12}$ in. broad. Spikes all peduncled. Spikelets oblong, acute .. 3. *P. distichum.*

1. **P. scrobiculatum** *Linn. Mant.* i (~~1771~~) 29.—Rhizome short. Culms tufted, erect or decumbent at the base, usually sheathed throughout by the leaves, glabrous, 1–3 ft. high. Leaves linear or linear-lanceolate, acute or acuminate, $\frac{1}{4}$–$\frac{1}{2}$ in. broad, glabrous or slightly hairy towards the base, flat or wrinkled ; margins rough ; ligule short, broad, membranous ; sheaths rather lax. Spikes varying in number from 2 to 6, 1–2 in. long, alternate towards the top of the culm, usually rather distant, spreading or erect ; rhachis $\frac{1}{12}$ in. broad, flat, margins ciliate. Spikelets in 2 or rarely 3–4 rows, imbricate, sessile or very shortly pedicelled, sometimes geminate on a common pedicel, ovoid-orbicular, obtuse, glabrous. Empty glumes subequal, thin and membranous, with a prominent midrib ; the outer one with a single marginal vein on each side ; the upper one with 2 marginal veins. Flowering glume similar in size and shape to the empty glumes, hard and coriaceous, brown, shining, minutely pitted. Palea coriaceous like the flowering glume, the margins produced into membranous inflected auricles.—*Hook. f. Fl. Nov. Zel.* i (~~1863~~) 291 ; *Handb. N.Z. Fl.* (1864) 323 ; *Benth. Fl. Austral.* vii (1878) 460 ; *Buch. N.Z. Grasses* (1879) t. 10A ; *Cheesem. Man. N.Z. Fl.* (1906) 845. P. orbiculare *Forst. f. Prodr.* (1786) n. 35 ; *A. Rich. Fl. Nouv. Zel.* (1832) 140 ; *A. Cunn. Precur.* (1836) n. 266 ; *Raoul Choix* (1846) 39.

North Island : Auckland—Lowland stations from the North Cape to the East Cape and Taranaki, not uncommon.

An abundant plant in all warm countries outside America.

P. distichum L. Sp. 1816?

Ex. 2. **P. Digitaria** *Poir. Encycl. Suppl.* iv (~~1817~~) 316.—Rhizome long, branched, creeping and rooting. Culms erect or ascending, sheathed throughout by the leaves, glabrous, 6–24 in. high. Leaves numerous, distichous, 2–8 in. long, $\frac{1}{6}$–$\frac{1}{3}$ in. broad, flat, glabrous or sparingly hairy towards the base ; ligules short, membranous, truncate ; sheaths compressed, striate, margins pilose above. Spikes rather slender, 1–2 in. long, usually 2 but sometimes 3 or even 4, the lateral ones sessile or nearly so ; rhachis flat, margins scabrid. Spikelets in 2 rows, nearly sessile, imbricate and appressed to the rhachis, ovate-oblong, acute, flattened, pale-green. Empty glumes equal, acute, membranous, pubescent or glabrous ; the lower one 3-nerved ; the upper 5-nerved, sometimes an additional minute empty glume is present at the base of the spikelet. Flowering glume coriaceous, smooth, shining,

L. Syst. Nat. Ed X 855 1759.
Muell. Bot. Zeit XIX 394 1861.
Ann. Bot. I.K.

faintly nerved. Palea smaller, coriaceous, margins inflexed but not auricled.—*Stapf. in Fl. Capen.* vii (1898) 370; *Cheesem. Man. N.Z. Fl.* (1906) 845.

North Island: Auckland—Near Ahipara, *T. F. C.*; Bay of Islands and Whangarei, *Petrie!* marshes by the Lower Waikato, *T. F. C.*; Coromandel, *Petrie!*

Probably introduced into New Zealand, as in Australia, South Africa, India, and other countries, but the localities it affects give it the appearance of being indigenous. It is a common plant in many parts of America, from Virginia southwards. It can be distinguished from *P. distichum* by its greater size, much broader flat leaves, and by the lateral spikes being sessile.

3. **P. distichum** *Linn. Syst. Nat.* (1759) 855.—Rhizome long, branched, creeping and rooting. Culms numerous, ascending, sheathed throughout by the leaves, glabrous, 2–8 in. high. Leaves numerous, distichous, 2–5 in. long by about $\frac{1}{12}$ in. broad, linear, acute, strict, spreading, usually involute; ligules short, truncate; sheaths thin, pale, loose, bearded at the mouth. Spikes 2, both peduncled and jointed on the top of the culm, usually spreading, 1–1½ in. long; rhachis narrower than the spikelets. Spikelets in 2 rows, sessile or nearly so, imbricate and appressed to the rhachis, oblong, acute or almost acuminate, flattened, glabrous, pale. Empty glumes equal, acute, thin and membranous, faintly 3–5-nerved. Flowering glume rather shorter than the empty glumes, coriaceous, pale, very indistinctly nerved. Palea coriaceous like the flowering glume, margins slightly auricled.—*Hook. f. Fl. Nov. Zel.* i (1853) 291; *Handb. N.Z. Fl.* (1864) 323; *Benth. Fl. Austral.* vii (1878) 460; *Buch. N.Z. Grasses* (1879) t. 10B; *Cheesem. Man. N.Z. Fl.* (1906) 846.

North Island: Auckland—Salt marshes from the North Cape to the Bay of Plenty and the Waikato River, abundant.

Widely distributed in all warm countries.

4. ISACHNE R. Br.

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Species about 25, widely spread in most tropical or subtropical regions. The single New Zealand species ranges through Australia to India and China.

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Isachne globosa (Thunb.) Kuntze. Rev. Gen. Pl. 2: 778. 1891.
Ailium = (um) Thunb. Fl. Japan. 49: 1784.
Isachne australis Trin. Prodr. 196: 1830.

about $\frac{1}{12}$ in. long. Empty glumes membranous, glabrous, many-nerved. Flowering glumes firm and coriaceous, unequal in size; the lower much the larger, smooth, shining; upper sometimes minutely pubescent. Lower flower usually male; upper female. Palea coriaceous like the flowering glume.—*Hook. f. Fl. Nov. Zel.* i (1853) 291; *Handb. N.Z. Fl.* (1864) 324; *Benth. Fl. Austral.* vii (1878) 625; *Buch. N.Z. Grasses* (1879) t. 12; *Cheesem. Man. N.Z. Fl.* (1906) 847.

North Island: Abundant in swamps from the North Cape to the East Cape, Lake Taupo, and Taranaki. South Island: Tuamarina Swamp, near Picton, Marlborough, *J. H. Macmahon!* Sea-level to 1800 ft.

Greedily eaten by cattle. In summer and autumn it often affords a large amount of nutritious pasturage in swampy districts.

5. **PANICUM** Linn. 1735

Annual or perennial grasses, of very various habit. Spikelets lanceolate to ovate or broadly oblong, rarely globose, acuminate or acute or obtuse, articulate on the pedicel, laxly or densely paniculate, or very shortly pedicelled along one side of slender simple or branched spikes, seldom awned, glabrous or pubescent, never with bristles or spines at the base, with a single terminal hermaphrodite flower, sometimes with a male one below it. Glumes 4; the lowermost small, sometimes minute, empty; the 2nd and 3rd unequal or subequal, membranous, awnless or rarely awned, empty or the 3rd containing a male or rudimentary flower; 4th or flowering glume shorter or as long as the 3rd, firmer and more coriaceous, hardening in fruit. Palea like the flowering glume but smaller, 2-nerved. Lodicules 2. Grain enclosed in the hardened flowering glume and palea, oblong or ellipsoid; hilum punctiform.

As characterized above, this is a heterogeneous assemblage of about 400 species, found in all warm climates, but rare or absent in temperate countries. The single New Zealand species belongs to the section *Digitaria*, often kept as a distinct genus, in which the spikelets are almost sessile on one side of simple digitate spikes.

Trans. 57 (1926)

Ex. 1. **P. sanguinale** *Linn. Sp. Plant.* (1753) 57.—Annual. Culms creeping or rooting at the base, then spreading or erect, 6–18 in. long. Leaves 1–6 in. long by $\frac{1}{6}$–$\frac{1}{3}$ in. broad, flat, flaccid, pubescent or glabrous; sheaths thin, rather loose, often pilose and bearded at the nodes; ligules truncate, membranous. Spikes few or many, usually 3–6, varying in length from 1 to 4 in., crowded at the end of the culm, strict, spreading or erect; rhachis triquetrous or flattened, margins scaberulous. Spikelets geminate, one sessile, the other pedicelled, oblong-lanceolate, acute, greenish or purplish, $\frac{1}{15}$–$\frac{1}{12}$ in. long. Outer glume very minute, ovate, acute; 2nd small, ovate-lanceolate, 3-nerved, about $\frac{1}{2}$ the length of the flowering glume; 3rd rather longer than the flowering glume, oblong, acute, 6–7-nerved, the nerves often ciliate; 4th or flowering glume oblong, firm and subcoriaceous, acute or acuminate. —*Benth. Fl. Austral.* vii (1878) 469; *Cheesem. in Trans. N.Z. Inst.* xx (1888) 175; *Man. N.Z. Fl.* (1906) 848.

Kermadec Islands: Not uncommon in shady places, *T. F. C., W. R. B. Oliver!* North and South Islands: Abundant as a naturalized weed.

The Kermadec Islands plant, which is the only one which can be considered as indigenous, is referred by Hackel to the variety *microbachne* (*Panicum microbachne* Presl), and is a much more delicate and slender plant than the type, which is now plentiful as a naturalized weed in cultivated ground in most parts of New Zealand, as in all warm countries.

var. microbachne Haek. 1910

6. **OPLISMENUS** Beauv.

Weak, delicate grasses. Culms decumbent and often rooting at the base, branched, ascending above, leafy. Leaves thin, flat, broad, ovate to lanceolate. Spikelets 1-flowered, jointed on the pedicel, in little clusters on the branches of a simple panicle or spike. Glumes 4, the 3 outer membranous, empty or the 3rd with a rudimentary palea; the outer short, 3-nerved, with a long straight rigid awn; 2nd rather longer, awn short or almost wanting; 3rd the largest, 5-nerved, usually awnless; 4th or flowering glume rather shorter than the 3rd, lanceolate, firm, smooth, awnless, hardened in fruit. Palea coriaceous like the flowering glume. Stamens 3. Styles distinct. Grain oblong, enclosed within the hardened flowering glume and palea.

Species probably not more than 4 or 5, widely distributed in the warm regions of both hemispheres.

1. **O. undulatifolius** *Beauv. Agrost.* (1812) 54.—Culms prostrate and rooting at the base, ascending above, slender, weak, sparingly branched, 6–18 in. long. Leaves 1–3 in. long by $\frac{1}{4}$–$\frac{1}{3}$ in. broad, rarely more, lanceolate, acuminate, flat, glabrous or sparsely pilose; sheaths and nodes more or less pilose. Spike slender, 2–4 in. long; rhachis glabrous or pilose with spreading hairs. Spikelets small, $\frac{1}{12}$–$\frac{1}{8}$ in. long, in distant sessile clusters of 2–6 or the uppermost solitary, sometimes the lower clusters are produced into a short spike-like branch. Empty glumes 3, concave, membranous, nerved, pilose, the lower one with a stout rigid awn $\frac{1}{5}$–$\frac{1}{2}$ in. long. Flowering glume pale, coriaceous, nerveless, shining.—*Cheesem. Man. N.Z. Fl.* (1906) 848. O. setarius *Roem. and Schult. Syst.* ii (1817) 481; *Benth. Fl. Austral.* vii (1878) 492. O. aemulus *Kunth Rev. Gram.* i (1829) 44; *Hook. f. Fl. Nov. Zel.* i (1853) 292. Orthopogon aemulus *R. Br. Prodr.* (1810) 194. Panicum imbecille *Trin. Sp. Gram.* (1823–36) t. 191; *Hook. f. Handb. N.Z. Fl.* (1864) 323. Hekaterosachne elatior *Steud. Syn. Plant. Gram.* (1855) 118.

Kermadec Islands, North Island: Abundant throughout in shaded lowland stations. South Island: Recorded from Nelson (*Travers*) and Canterbury (*Lyall*), but I have seen no specimens.

An abundant plant in all warm climates, and barely distinct from the widely diffused *O. compositus* Beauv.

7. **CENCHRUS** Linn.

Annual or perennial grasses, usually tall. Leaves flat, flaccid. Spikelets narrow, with a single terminal hermaphrodite flower with or without a male flower below it, enclosed 1–4 together in an ovoid or globose involucre of numerous bristles or spines, the inner of which are broad and flattened, connate at the base and hardened in fruit; the involucres sessile in a terminal spike or raceme, and deciduous with the spikelets. Glumes 4; the outer much the smallest, sometimes minute, empty; 2nd equalling the 3rd or a little shorter, empty; 3rd usually containing a palea and sometimes 3 stamens; 4th or flowering glume rather shorter than the 3rd and more rigid. Stamens 3. Styles often connate at the base. Grain enclosed in the flowering glume and palea, free from them.

Species about 12, in the warm regions of both hemispheres and in temperate North America.

1. **C. calyculatus** *Cav. Ic.* v (1791–1901 39, t. 463.—Culms tufted, tall, stout, glabrous, 2–4 ft. high or more. Leaves long, linear-lanceolate, acuminate, $\frac{1}{3}$–$\frac{2}{3}$ in. broad, flat, glabrous, scaberulous on the margins and veins above; sheaths long, rather lax; ligule split into numerous fine erect bristles. Spike 5–10 in. long by $\frac{1}{2}$ in. broad, stout, dense; rhachis angular, pubescent. Involucres about $\frac{1}{3}$ in. long, sessile or very shortly pedicelled, spreading or at length deflexed, broadly ovoid; inner bristles 8–12, connate at the base, compressed, unequal in length, sometimes one much longer than the rest, lower $\frac{2}{3}$ plumose with soft spreading hairs, upper $\frac{1}{3}$ rough and scabrous; outer bristles numerous, much shorter, spreading, subulate, scabrous throughout. Spikelets 1 or 2 within the involucres; outer empty glume half the length of the 2nd, ovate, acute, 1-nerved; 2nd rather shorter and broader than the 3rd, 3-nerved; 3rd with a palea and male flower, 5–7-nerved; 4th or flowering glume rather shorter and narrower, firmer in texture.—*Cheesem. in Trans. N.Z. Inst.* xx (1888) 175; *Man. N.Z. Fl.* (1906) 849. C. anomoplexis *Lab. Sert. Austr. Caled.* (1824–25) 14, t. 19.

Kermadec Islands: Sandy soil on the north side of Sunday Island, not common, *T. F. C., W. R. B. Oliver!* Also a native of New Caledonia and others of the Pacific islands.

8. **SPINIFEX** Linn. 1771 Mant.

Usually wide-creeping hard and stout branching grasses. Leaves long, involute, silky. Inflorescence dioecious. Male spikelets 2-flowered, sessile or shortly pedicelled, articulate on long erect spikes which are arranged in umbels surrounded by leafy spathaceous bracts. Glumes 4, all membranous, awnless: 2 lowest empty; 3rd and 4th each with a palea and 3 stamens. Female spikelets 1- or rarely 2-flowered, numerous, each one solitary at the base of long rigid pungent stellately spreading spines, surrounded by short lanceolate bracts, the whole inflorescence forming a large globose head. Glumes 4, subequal, narrow; 2 lowest empty; 3rd with a palea and sometimes with a rudimentary male flower; 4th with a female flower. Lodicules 2, large. Styles long, free; stigmas plumose. Grain free within the hardened flowering glume and palea.

A small genus of 4 species, 3 of which are found in Australia, one of them extending to New Zealand and New Caledonia, the fourth stretching from Ceylon and India to Java, China, and Japan.

1. **S. hirsutus** *Labill. Pl. Nov. Holl.* ii (1806) 81, t. 230, 231.—Stems creeping and rooting, branched, often many feet long, stout, knotted, silky or woolly. Leaves 1–2 ft. long, coriaceous, flexuous, densely clothed with soft silky hairs, margins strongly involute; sheaths long, broad, the inner smooth and shining; ligules split into a dense brush of erect silky hairs. Male spikes numerous, 2–4 in. long, arranged in a terminal umbel, with or without a cluster of 2–3 placed lower down the culm. Spikelets about $\frac{1}{3}$ in. long. Glumes silky, 5–7-nerved. Female heads large, globose, 6–12 in. diam.; spines very numerous, spreading all round, slender, subulate, pungent-pointed. Spikelets very narrow, acute or acuminate, $\frac{1}{2}$ in. long. Glumes 7–9-nerved.—*Hook. f. Fl. Nov. Zel.* i (1853) 292; *Handb. N.Z. Fl.* (1864) 322; *Benth. Fl. Austral.* vii (1878) 503; *Buch. N.Z. Grasses* (1879) 503; *Cheesem. Man. N.Z. Fl.* (1906) 850; *Cockayne Veg. N.Z.* (1921) t. 6. S. sericeus *R. Br. Prodr.* (1810) 198; *A. Rich. Fl. Nouv. Zel.* (1832) 122; *A. Cunn. Precur.* (1836) n. 268; *Raoul Choix* (1846) 40. Ixalum inerme *Forst. f. Prodr.* (1786) n. 564.

S. inermis B+S. ex Hk f. H.N.Z. 1. 292
also see Black Trans. R.S.S.A. 1933 : 143

NORTH ISLAND: Abundant on sandhills near the sea. SOUTH ISLAND: Nelson—Sandy shores of Blind Bay, *T. F. C.*; Cape Farewell, *H. H. Travers.* Canterbury—*Travers, Armstrong.*

Also common in Australia and New Caledonia. It is a valuable plant for fixing the surface of moving sand-dunes. Its use for that purpose is fully described in Dr. Cockayne's "Report on the Dune Areas of New Zealand." (Wellington, 1911.)

9. EHRHARTA Thunb. 1779

Perennial or annual grasses, of very varied habit. Leaves flat or convolute. Spikelets laterally compressed, 1-flowered, pedicellate, arranged in a panicle or simple raceme; rhachilla disarticulating above the 2 lowest glumes, obscurely produced above the flower. Glumes 5; the 2 lowest short, empty; 3rd and 4th longer, awned, frequently hairy at the base, also empty, 4th the longest, often with a callus at its base; 5th or flowering glume shorter, thinner, never awned, usually with a callus or tuft of hairs at its base. Palea narrow, keeled, finely and closely 2-nerved. Stamens 6 in the great majority of the species, 2 only in the New Zealand ones. Styles short or rather long; stigmas plumose. Grain ovoid or elliptic, compressed, enclosed within the flowering glume and palea, but free from them.

A genus of 27 species, all but the two following natives of South Africa, one of them extending northwards to eastern tropical Africa and Arabia.

Culms 6–18 in. Panicle 2–4 in., many-spiculate. Two lowest empty glumes acute .. .. 1. *E. Colensoi.*
Culms 1–5 in. Raceme small, of 2–5 spikelets. Two lowest empty glumes broad, obtuse .. .. 2. *E. Thomsoni.*

Microlaena Colensoi (Hook.f.) Petrie Trans. 43: 368 Sub. 4: 2. 472

1. **E. Colensoi** *Hook. f. Fl. Nov. Zel.* i (1853) 288, t. 65A.—Culms numerous, tufted, branched at the base, glabrous, many-noded, 6–18 in. high. Leaves numerous, distichous, suberect, the upper ones 4–6 in. long by $\frac{1}{6}$–$\frac{1}{5}$ in. broad, flat, faintly nerved, glabrous, tapering from the base to a slender point, the lowermost with the blades much reduced in size and almost scale-like; ligules very short, jagged; sheaths short, close, firm, thin, striate, glabrous. Panicles contracted, inclined or drooping, $1\frac{1}{2}$–4 in. long; rhachis slender, smooth; branches short, suberect, in small specimens sometimes reduced to single spikelets. Spikelets compressed, linear-oblong, about $\frac{1}{4}$ in. long; pedicels short, slender. Two lowest glumes about $\frac{1}{2}$ the length of the 3rd and 4th respectively, acuminate, 3–5-nerved; 3rd and 4th narrower, awned, silky-hairy at the base, 5–7-nerved. Flowering glume shorter than the 4th and about equal to the 3rd, oblong, obtuse, glabrous. Palea linear; rhachilla produced behind it as a minute appendage.—*Hook. f. Handb. N.Z. Fl.* (1864) 319; *Buch. N.Z. Grasses* (1879) t. 1; *Cheesem. Man. N.Z. Fl.* (1906) 851; *Ill. N.Z. Fl.* ii (1914) t. 219.

NORTH ISLAND: Ruahine Mountains, *Colenso! H. Hill! Petrie!* Mount Egmont, *T. F. C.*; Tararua Mountains, *H. H. Travers!* SOUTH ISLAND: Nelson—Mount Arthur, Mount Owen, *T. F. C.*; Mount Rochfort, Mount Faraday, *W. Townson!* Canterbury and Westland—Mountains above Arthur's Pass, *T. F. C.*; Candlestick Mountains, Mount Peel, *Cockayne;* Kelly's Hill, *Petrie!* Griffin Range, *P. G. Morgan.* Otago—Clinton Saddle, Lake Te Anau, *Petrie!* Southland—*Crosby Smith!* 3000–5500 ft.

M. thomsoni Petrie Sub. 1c. 2: 472.

2. **E. Thomsoni** *Petrie in Trans. N.Z. Inst.* xii (1880) 356, t. 10.—A small densely tufted species. Culms short, stout, much branched, spreading, quite glabrous, 1–5 in. high. Leaves numerous, distichous, spreading,

Petriella Colens. Trans 73: 235.
1. P. Colensoi (Hook.f.) Petrie
2. P. thomsoni Petrie

$\frac{1}{3}$–$\frac{1}{2}$ in. long, $\frac{1}{12}$–$\frac{1}{8}$ in. broad, lanceolate, acute, strongly nerved; ligule reduced to a mere line; sheaths pale, strongly grooved. Inflorescence reduced to a short stout erect raceme of 2–5 spikelets, sometimes hardly longer than the leaves; pedicles short, stout, often appressed to the rhachis. Spikelets $\frac{1}{6}$–$\frac{1}{5}$ in. long, compressed. Two outer glumes small, subequal, broadly oblong or rounded, obtuse, less than $\frac{1}{3}$ as long as the 3rd and 4th respectively; 3rd and 4th ovate-lanceolate, rigid, keeled, awned, 5-nerved, silky at the base, keel and awns minutely scabrid. Flowering glume shorter, oblong, obtuse or subacute, 3–5-nerved. Palea linear. Stamens 1–2.—*Cheesem. Man. N.Z. Fl.* (1906) 852.

SOUTH ISLAND: Nelson—Mount Rochfort, *Dr. Gaze! W. Townson!* Otago—Longwood Range, *T. Kirk!* STEWART ISLAND: Port Pegasus, *Thomson* and *Petrie! T. Kirk!* Rakiahua, *P. Goyen!* AUCKLAND ISLANDS: *F. R. Chapman!* Sea-level to 4000 ft.

A very curious and distinct little species.

10. MICROLAENA R. Br.

Slender perennial grasses; culms simple or branched. Leaves flat or convolute when dry. Spikelets laterally compressed, 1-flowered, pedicellate, arranged in a narrow lax panicle; rhachilla disarticulating above the 2 outer glumes. Glumes 5; the 2 outer very small, persistent; 3rd and 4th long, narrow, produced into long awns, the 4th much the longest; 5th or flowering glume shorter, acute, not awned. Palea linear. Lodicules 2, rather large, thin. Stamens 4 or 2. Styles distinct; stigmas plumose. Grain enclosed within the flowering glume and palea but free from them.

A small genus of 7 species, confined to Australia and New Zealand. One of the New Zealand species is also found in Australia, the remaining three are endemic.

* The two outer glumes distant from the 3rd and 4th.

Leaves flat, thin, $\frac{1}{8}$–$\frac{1}{5}$ in. broad. Panicle 3–9 in., narrow. Stamens 4 .. .. 1. *M. stipoides.*

** The 2 outer glumes not distant from the 3rd and 4th.

Culms not branched. Leaves broad, $\frac{1}{4}$–$\frac{1}{2}$ in. Panicles 1–2 ft., compound. Stamens 2 .. .. 2. *M. avenacea.*

Culms decumbent at the base. Leaves $\frac{1}{8}$–$\frac{1}{4}$ in. broad. Panicles 5–9 in. long, narrow. Stamens 2 .. .. 3. *M. Carsei.*

Culms branched. Leaves $\frac{1}{10}$–$\frac{1}{8}$ in. broad. Panicle reduced to a simple raceme 1–3 in. long, rarely branched at the base. Stamens 4 .. .. 4. *M. polynoda.*

1. **M. stipoides** *R. Br. Prodr.* (1810) 210.—Rhizome creeping and rooting, branched. Culms numerous from the rhizome, often branched below, erect or ascending, slender, glabrous, 1–2 ft. high or more. Leaves rather short, 3–9 in. long, $\frac{1}{8}$–$\frac{1}{5}$ in. broad, thin, flat, acute, glabrous, finely scaberulous on the midrib beneath; ligules very short, reduced to a mere rim; sheaths thin, usually finely pubescent. Panicle narrow, slender, lax, branched at the base, 3–9 in. long; branches erect, capillary. Spikelets narrow, about $\frac{1}{3}$ in. long without the awns, on filiform pedicels. Two outer glumes minute, persistent, many times smaller than the 3rd and 4th, and separated from them by an elongated bearded portion of the rhachilla; 3rd and 4th long and narrow, produced into slender awns, the 4th longer than the 3rd, its awn often more than 1 in. long, nerves 5–7, with the awns rough and scabrid. Flowering glume much shorter, acuminate but

Zotov (Trans 73: 235) places M. Carsei as M. avenacea var. carsei (Cheesm.) Zot.

not awned, faintly 7-nerved. Palea linear. Lodicules large. Stamens 4. —*Hook. f. Fl. Nov. Zel.* i (1853) 289; *Handb. N.Z. Fl.* (1864) 320; *Benth. Fl. Austral.* vii (1878) 552; *Buch. N.Z. Grasses* (1879) t. 2; *Cheesem. Man. N.Z. Fl.* (1906) 852. Enharta stip. habit. 1804 i—16. t 118.

North Island: Not uncommon throughout, but most plentiful in lowland districts. South Island, Stewart Island: In various localities, chiefly near the sea. Sea-level to 2000 ft.

Widely distributed in Australia, ranging from Queensland to Tasmania and West Australia. It is a most valuable pasture and lawn grass, deserving of far more attention than has hitherto been given to it.

(Lam)

2. **M. avenacea** *Hook. f. Handb. N.Z. Fl.* (1864) 320.—Culms tufted, tall, stout, erect or spreading, compressed, glabrous, 1–4 ft. high. Leaves mostly towards the base of the culms and shorter than them, broad, flat, $\frac{1}{4}$–$\frac{1}{2}$ in. diam., glabrous, striate, scaberulous on the margins and principal veins; sheaths long, smooth, deeply striate; ligules broad, bearded at the sides. Panicle 1–2 ft. long, sparingly branched, compound, lax, nodding, pale-green; branches long, slender, almost capillary, angled, scaberulous. Spikelets very narrow, about $\frac{1}{3}$ in. long without the awns, usually 1 in. with them; pedicles slender, thickened above. Two lowest glumes small, many times less than the 3rd and 4th, not separated from them by a conspicuous interspace as in *M. stipoides*, 1-nerved, obtuse, sometimes notched at the tip, the outer one $\frac{1}{2}$ the length of the 2nd; 3rd and 4th long, narrow, empty, 5–7-nerved, rough and scabrous, hairy at the base, produced into long awns. Flowering glume much shorter than the 4th, acuminate but not awned, faintly 5–7-nerved. Palea linear, acuminate, 1-nerved. Stamens 2.—*Buch. N.Z. Grasses* (1879) t. 3; *Cheesem. Man. N.Z. Fl.* (1906) 853. Diplax avenacea *Raoul Choix* (1846) 11, t. 3; *Hook. f. Fl. Nov. Zel.* i (1853) 289. Ann. Sci Nat. 1844: 2: 116.

North and South Islands, Stewart Island: Abundant in forests throughout. Auckland Islands: In forest, but not common, *J. S. Tennant!* Sea-level to 2500 ft. December–January.

3. **M. Carsei** *Cheesem. in Trans. N.Z. Inst.* xlvii (1915) 47.—Rhizome slender, stoloniferous. Culms slender, prostrate or ascending at the base, erect above, 6–18 in. high, smooth and glabrous, 1–3-noded, often rooting from the lower nodes and emitting fascicles of both barren and flowering shoots. Leaves short or long, 6–12 in. long, $\frac{1}{8}$–$\frac{1}{4}$ in. broad, gradually tapering to a fine point, thin, flat, glabrous, striate, faintly scaberulous on the principal veins and margins; sheaths long, smooth, compressed, strongly grooved; ligules short, thin, furnished with a few long hairs at the sides. Panicle 5–9 in. long, rarely more, compound, but much more sparingly branched than in *M. avenacea* and much narrower and more rigid, pale-green; branches erect, appressed to the main rhachis, slender, angled, scaberulous. Spikelets narrow, compressed, $\frac{2}{3}$–$\frac{3}{4}$ in. long with the awns. Two lowest glumes small, many times shorter than the 3rd and 4th, not separated from them by a conspicuous interspace, the lowest $\frac{1}{3}$ the length of the 2nd, which is irregularly notched at the top; 3rd and 4th long, narrow, empty, unequal, the 4th rather more than twice the length of the 3rd, 5–7-nerved, scabrid, hairy at the base, long-awned at the tip. Flowering-glume much shorter than the 4th, acuminate but not awned, faintly 5–7-nerved. Palea linear, 1-nerved. Stamens 2.

NORTH ISLAND: Damp forests at Kaiaka, Mongonui County, *H. Carse!* Closely allied to *M. avenacea*, but smaller in all its parts, and with a very different habit of growth. Leaves shorter and narrower. Panicle also shorter and narrower, and much less divided. Spikelets smaller, with shorter pedicels and much shorter awns.

4. **M. polynoda** *Hook. f. Handb. N.Z. Fl.* (1864) 320.—Culms 3–8 ft. long, much branched, straggling, often scrambling among shrubs and bushes, hard, solid, terete, as thick as a goose-quill at the base, quite glabrous, conspicuously swollen at the nodes. Leaves numerous, rather distant, the lowermost reduced to sheaths, upper 3–9 in. long, $\frac{1}{10}$–$\frac{1}{6}$ in. broad, linear, finely acuminate, flat, striate, margins scaberulous; sheaths smooth, grooved; ligules short, with a few long hairs on each side. Panicle usually reduced to a simple raceme 1–2$\frac{1}{2}$ in. long with few spikelets, but sometimes 3–3$\frac{1}{2}$ in., the lower portion with 1 or 2 short erect 2–3-spiculate branches. Spikelets narrow, compressed, $\frac{1}{2}$–$\frac{3}{4}$ in. long with the awns. Two lowest glumes small, whitish, many times less than the 3rd and 4th, not separated from them by a distinct interspace, the lowest $\frac{1}{3}$ the length of the 2nd; 3rd and 4th narrow, unequal, empty, awned, rough and scabrous on the sides and awn, hairy at the base. Flowering glume shorter than the 4th, acuminate, 5–7-nerved. Palea linear, 1-nerved. Stamens 4.—*Buch. N.Z. Grasses* (1879) t. 4; *Cheesem. Man. N.Z. Fl.* (1906) 853. M. ramosissima *Col. in Trans. N.Z. Inst.* xxi (1889) 105. Diplax polynoda *Hook f. Fl. Nov. Zel.* i (1853) 290.

NORTH ISLAND: Auckland—Reef Point, Ahipara, *R. H. Matthews!* Whangarei Heads, *T. F. C.;* Great Barrier Island, *T. Kirk!* Cabbage Bay, *Adams;* Coromandel, *T. F. C;* Thames, *T. Kirk;* Te Aroha, *Adams;* Muriwai, *T. F. C.* Hawke's Bay—Dannevirke, base of the Ruahine Range, *Colenso!* Weber, Feilding, *B. C. Aston.* SOUTH ISLAND: Nelson—Motueka Valley, *T. F. C.* Canterbury—*Armstrong;* Banks Peninsula, *Cockayne.* Otago—Near Dunedin, *Buchanan! Petrie!* Sea-level to 1500 ft. December–January.

11. HIEROCHLOE (Gmel. 1747) R. Br. 1810

Erect sweet-scented perennial grasses. Leaves flat. Spikelets in an open or close panicle, laterally compressed, shining, with 1 terminal hermaphrodite flower and 1–2 male flowers below it. Glumes 5; 2 outer empty, equal or nearly so, acute, keeled, scarious, 1–3-nerved; 3rd and 4th subsimilar, often shortly awned, each enclosing a narrow palea and usually 3 stamens; 5th rather smaller, obtuse or mucronate, 5-nerved, enclosing a hermaphrodite flower and a linear 1–2-nerved palea. Lodicules 2. Styles free; stigmas plumose. Grain oblong, free within the slightly indurated flowering glume and palea.

Species 12 or 13, distributed throughout the temperate and frigid zones of both hemispheres. All the species have a vanilla-like fragrance when drying. Of the three found in New Zealand, one is widely spread in the South Temperate Zone, another extends to Victoria and Tasmania, the third is endemic in the Auckland Islands.

* Two outer glumes about equal to the florets.

Culms 2–3 ft. Leaves long, $\frac{1}{4}$–$\frac{1}{2}$ in. broad. Spikelets $\frac{1}{4}$ in. long; outer glumes equalling or slightly exceeding the florets .. 1. *H. redolens.*

Culms 6–18 in. Leaves short, $\frac{1}{12}$–$\frac{1}{5}$ in. broad. Spikelets $\frac{1}{5}$ in. long; outer glumes usually slightly shorter than the florets .. .. 2. *H. Fraseri.*

** Two outer glumes much longer than the florets.

Culms 1–2 ft. Leaves involute, subcoriaceous. Spikelets $\frac{1}{3}$ in. long 3. *H. Brunonis.*

H. alpina (Swartz ex Willd.) Roem & Schultz. 1817 516.
Holcus a. Sw. ex W. 1805:937.
Hierochloe Fraseri Hook.f. 1844:93
H. antarctica (habill.) R. Br. 1810. ex Hook.f. 1844:91.

Forst.f.

1. **H. redolens**, *R. Br. Prodr.* (1810) 209.—Culms tufted, leafy, decumbent at the base, erect or ascending above, stout or rather slender, 1½–3 ft. high or even more. Leaves numerous, shorter than the culms or almost equalling them, ¼–½ in. broad, flat, deeply striate, smooth or minutely scaberulous, bright shining-green; sheaths long, compressed, deeply striate; ligules broad, scarious. Panicle pale yellowish-brown, shining, open or dense, inclined or nodding, very variable in size, usually from 4 to 12 in. long, more rarely elongated and reaching 14 or 18 in.; rhachis slender, glabrous; branches very slender, almost capillary, more or less hairy or almost glabrous, lower 2–3 in. long. Spikelets ¼ in. long and broad, shortly pedicellate; pedicels shorter than the spikelets, pilose. Glumes all thin and membranous; outer 2 equalling or sightly exceeding the 3rd and 4th, ovate, acuminate, with a stout continuous midrib and a short basal lateral vein on each side; 3rd and 4th each enclosing a male flower, ovate-oblong, obtuse, 5-nerved, pubescent, silky-ciliate on the margins and keel, with a short awn from the back a little below the tip; 5th smaller than the 4th, glabrous below, slightly hairy above, mucronate or very shortly awned. Palea linear-oblong, 1–2-nerved.—*Hook. f. Fl. Antarct.* i (1844) 92; *Fl. Nov. Zel.* i (1853) 300; *Handb. N.Z. Fl.* (1864) 321; *Fl. Tasm.* ii (1860) 108; *Benth. Fl. Austral.* vii (1878) 558; *Buch. N.Z. Grasses* (1879) t. 6; *Cheesem. Man. N.Z. Fl.* (1906) 855. Nomen nudum.
H. antarctica *R. Br. Prodr.* (1810) 209. Holcus redolens *Forst. f. Prodr.* (1786) n. 563. Torresia redolens *Roem. and Schult. Syst.* ii (1817) 516; *A. Cunn. Precur.* (1836) n. 269.

North and South Islands, Stewart Island, Chatham Islands, Campbell Island: Abundant in moist places throughout. Sea-level to 4000 ft.

Also in Fuegia, Tasmania, and Victoria. It varies much in size and degree of robustness, and appears to pass by easy gradations into the next species.

(Forst.f.?)

2. **H. Fraseri**, *Hook. f. Fl. Antarct.* i (1844) 93.—Smaller and more slender than *H. redolens*, with narrower leaves. Culms tufted, sometimes densely so, slender, quite smooth and glabrous, 6–18 in. high, rarely more. Leaves much shorter than the culms, 3–9 in. long, strict, erect, flat, ⅛–½ in. broad, quite smooth; ligules broad, scarious. Panicle pale yellowish-brown, often tinged with purple, short, ovate, open, shining, 1½–4 in. long; branches often few, capillary, usually glabrous. Spikelets ⅛ in. long and broad, shortly pedicelled; pedicels glabrous or more or less bearded. Glumes all thin and membranous; outer 2 usually slightly shorter than the 3rd and 4th, obtuse or subacute, 3-nerved but the lateral nerves often short; 3rd and 4th each enclosing a male flower, oblong, obtuse, 5-nerved, pubescent, margins silky-ciliate for their whole length, awn short, straight, from the back a little below the tip; 5th smaller than the 4th, glabrous or nearly so at the base, pubescent or ciliate above, tip produced into a short awn. Palea linear, 1–2-nerved.—*Cheesem. Man. N.Z. Fl.* (1906) 855; *Ill. N.Z. Fl.* ii (1914) t. 220; H. redolens *var.* Fraseri *Benth. Fl. Austral.* vii (1878) 559. H. borealis *Hook. f. Fl. Nov. Zel.* i (1853) 300; *Fl. Tasm.* ii (1862) 108 (*not of Roem. and Schult.*); *Buch. N.Z. Grasses* (1879) t. 7.

( ) Zotov. comb. nov.

Var. **recurvata** *Hack. MS.*—Awn of 4th glume inserted on the middle of the back of the glume, slightly geniculate above. Spikelets rather larger.

North and South Islands, Stewart Island: Not uncommon in mountain districts from the East Cape, Mount Egmont, and the Central Volcanic Plateau southwards. Sea-level to 4500 ft.

See T. Kirk Trans 14:1882:385

Also in Tasmania. A puzzling plant, large states of which cannot be clearly separated from *H. redolens*, although usually differing in the smaller size, slender habit, shorter and more open panicles, and smaller spikelets, with the empty glumes rather shorter than the 3rd and 4th. Sir J. D Hooker referred it to *H. borealis* in the Flora, and to *H. alpina* in the Handbook. But Professor Hackel remarks that it differs from both of these species in the short blunt outer glumes, and from *H. alpina*, in addition, in the much longer branches of the panicle, and in the awn of the 4th glume being usually inserted just beneath the apex and not geniculate. Var. *recurvata* approaches *H. alpina* in the awn of the 4th glume, but the panicle, &c., is different.

3. **H. Brunonis** *Hook. f. Fl. Antarct.* i (1844) 93, t. 52.—Culms laxly tufted, inclined at the base, erect above, glabrous, leafy, 1–1½ ft. high. Leaves shorter than the culms, ⅛–⅓ in. broad, rather strict, suberect, linear-subulate, involute, subcoriaceous, glabrous, deeply striate on the inner face, pale shining-green ; sheaths compressed, striate ; ligules ovate, scarious. Panicle inclined or nodding, shining, rather dense, ovate-lanceolate, 3–5 in. long by 1–1½ in. broad ; rhachis slender, glabrous ; branches suberect, the lower about 1 in. long. Spikelets ⅓ in. long, pedicelled ; pedicels sparsely pilose. Glumes all membranous ; outer 2 much longer than the 3rd and 4th, sometimes nearly twice as long, lanceolate, long-acuminate, glabrous, 3-nerved ; 3rd and 4th each enclosing a male flower, ovate-oblong, obtuse, 5-nerved, deeply bifid at the tip, pubescent or pilose, margins silky-ciliate, awn rather long, rising from the back a little distance below the base of the lobes ; 5th similar to the 4th but smaller and much less pubescent, usually glabrous at the base. Palea linear-oblong, 1–2-nerved.—*Handb. N.Z. Fl.* (1864) 322 ; *Cheesem. Man. N.Z. Fl.* (1906) 856.

Auckland and Campbell Islands : Abundant on the hills, *Sir J. D. Hooker, T. Kirk! Buchanan!* Sea-level to 1400 ft.

The long empty glumes readily separate this from any form of *H. redolens*.

12. **STIPA** Linn. 1735

Tufted perennial grasses. Leaves usually convolute, rarely flat. Spikelets narrow, terete, 1-flowered, in an open or contracted panicle ; rhachilla disarticulating above the 2 outer glumes. Glumes 3 ; the 2 outer empty, usually persistent, keeled, acute, rarely awned ; 3rd or flowering glume rigid, convolute, terete, 5–7-nerved, usually with a bearded callus at the base, tapering upwards into an entire or minutely 2-lobed tip, with a long terminal geniculate awn often spirally twisted below the bend. Palea 2-nerved, enclosed within the flowering glume. Lodicules usually 3, large. Stamens 3, seldom fewer. Styles distinct, rather short. Grain narrow, terete, tightly enclosed by the hardened flowering glume and palea.

A genus of over 100 species, spread over the temperate and tropical regions of both hemispheres. Two of the New Zealand species extend to Australia, the third is endemic.

Tall, 2–5 ft. Panicle 1–2½ ft., lax, nodding. Spikelets minute, 1/10–⅛ in. Stamen 1	1. *S. arundinacea.*
Densely tufted, 1–3 ft. Leaves long, terete. Panicle 4–9 in., narrow, strict, erect. Spikelets ¾ in.	2. *S. teretifolia.*
Tufted, 1–2 ft. Leaves short, filiform. Panicle 4–8 in., lax, erect. Spikelets ¼ in.	3. *S. setacea.*

(1844.)

1. **S. arundinacea** *Benth. in Journ. Linn. Soc.* xix (1881) 81.—Rhizomes short, creeping, scaly. Culms very densely tufted, tall, erect, nodding, rigid, quite glabrous, 2–5 ft. high. Leaves from the distant nodes of

oryzopsis rigida (Richard) Zotov Trans 75 : 235.
Agrostis rigida Rich. 1832 p. 124 n. 191.

the culms, the lowermost reduced to appressed sheaths, upper 6–12 in. long, $\frac{1}{8}$–$\frac{1}{5}$ in. broad, coriaceous, flat or involute, margins and midrib slightly scaberulous; sheaths very long, closely appressed, finely ciliate along the margins; ligules short, truncate. Panicles very large and lax, nodding, 1–2½ ft. long; rhachis very slender, glabrous; branches in distant whorls of 5–8, capillary, again compound, spreading, finely scaberulous, 3–6 in. long. Spikelets minute, $\frac{1}{10}$–$\frac{1}{8}$ in. long, greenish-purple. Two outer glumes almost equal, lanceolate, acuminate, membranous, scaberulous along the keel, lower 1-nerved, upper 3-nerved; 3rd or flowering glume much shorter, sessile on a short glabrous callus, rigid, convolute, pubescent towards the tip; awn slender, scabrid, deciduous, about $\frac{1}{3}$ in. long. Palea linear-oblong, 2-nerved. Stamen 1.—*Cheesem. Man. N.Z. Fl.* (1906) 857. Apera arundinacea *Hook. f. Fl. Nov. Zel.* i (1853) 295, t. 67; *Handb. N.Z. Fl.* (1864) 326; *Buch. N.Z. Grasses* (1879) t. 17. A. purpurascens *Col. in Trans. N.Z. Inst.* xxi (1889) 106. Benth. 1881. p 81.

North and South Islands: Auckland—East Cape, *Bishop Williams.* Hawke's Bay—Petane, *A. Hamilton!* Dannevirke and Cape Turnagain, *Colenso!* Wellington—Wairarapa, *Buchanan!* near Masterton, *W. Townson!* South Karori, *T. Kirk.* Nelson—Foxhill, Wangapeka, *T. F. C.* Marlborough—Picton Water Reserve, *J. H. Macmahon;* Pelorus Valley, *Rutland!* Canterbury—Banks Peninsula, at Pigeon Bay and Long Bay, *R. M. Laing!* Akaroa, *Raoul, T. Kirk!* Rakaia Gorge, *H. H. Allan.* Otago—Near Dunedin, *Buchanan! Petrie! Thomson!* Horse Ranges and Kaitangata, *Petrie.* Sea-level to 1500 ft.

A very handsome species. It is closely allied to *S. verticillata* Nees (*Streptachne ramosissima* Trin.), an Australian species which is often grown in gardens, and which has established itself in several localities, but which differs in the rather larger spikelets with a much longer persistent awn, and in having 3 stamens.

see Kirk. Trans 14 : 1882 : 385

2. **S. teretifolia** *Steud. Syn. Pl. Gram.* (1855) 128.—Culms densely tufted, forming large tussocks, rigid, erect, smooth and polished, quite glabrous, 1½–3 ft. high. Leaves longer or shorter than the culms, slender, smooth, rigid, terete, about $\frac{1}{30}$ in. diam., tips acicular; sheaths long, margins scarious; ligules membranous, entire. Panicle narrow, strict, erect, 4–9 in. long; rhachis smooth; branches few, erect, capillary, and with the pedicels glabrous. Spikelets narrow, about $\frac{3}{4}$ in. long without the awn. Two outer glumes subequal, lanceolate, acuminate, finely 3-nerved, membranous, pale whitish-green; 3rd or flowering glume much shorter, rigid and convolute, lanceolate, acuminate, densely clothed with long silky hairs, shortly bifid at the apex; awn from between the lobes, often over 1 in. long, curved or abruptly bent, minutely pubescent. Palea $\frac{3}{4}$ the length of the flowering glume, linear, silky, 2-nerved. Stamens 3.—*Benth. Fl. Austral.* vii (1878) 567; *Cheesem. Man. N.Z. Fl.* (1906) 857. Dichelachne stipoides *Hook. f. Fl. Nov. Zel.* i (1853) 294, t. 66; *Handb. N.Z. Fl.* (1864) 325; *Buch. N.Z. Grasses* (1879) t. 14.

North Island: Rocky or sandy places near the sea, from the North Cape to the Bay of Plenty and Raglan, abundant.

Not uncommon in Australia and Tasmania. Hooker quotes *Agrostis rigida* A. Rich. as a synonym, but Richard's description does not suit, and his plant was gathered in the French Pass, near Nelson, far beyond the southern limit of *S. teretifolia.*

3. **S. setacea** *R. Br. Prodr.* (1810) 174.—Culms tufted, slender, wiry, erect, glabrous, 1–2 ft. high. Leaves numerous towards the base of the

n, erect,
narrow,

Stipa setacea, RBr.

not native to N.Z. see T.N.Z.I.
vol. 57, p. 68. (Ckn. & Allan).

Also in Tasmania. A puzzling plant, large states of which cannot be clearly separated from *H. redolens*, although usually differing in the smaller size, slender habit, shorter and more open panicles, and smaller spikelets, with the empty glumes rather shorter than the 3rd and 4th. Sir J. D Hooker referred it to *H. borealis* in the Flora, and to *H. alpina* in the Handbook. But Professor Hackel remarks that it differs from both of these species in the short blunt outer glumes, and from *H. alpina*, in addition, in the much longer branches of the panicle, and in the awn of the 4th glume being usually inserted just beneath the apex and not geniculate. Var. *recurvata* approaches *H. alpina* in the awn of the 4th glume, but the panicle, &c., is different.

3. **H. Brunonis** *Hook. f. Fl. Antarct.* i (1844) 93, t. 52.—Culms laxly tufted, inclined at the base, erect above, glabrous, leafy, 1–1½ ft. high. Leaves shorter than the culms, ⅛–⅓ in. broad, rather strict, suberect, linear-subulate, involute, subcoriaceous, glabrous, deeply striate on the inner face, pale shining-green ; sheaths compressed, striate ; ligules ovate, scarious. Panicle inclined or nodding, shining, rather dense, ovate-lanceolate, 3–5 in. long by 1–1½ in. broad ; rhachis slender, glabrous ; branches suberect, the lower about 1 in. long. Spikelets ⅓ in. long, pedicelled ; pedicels sparsely pilose. Glumes all membranous ; outer 2 much longer than the 3rd and 4th, sometimes nearly twice as long, lanceolate, long-acuminate, glabrous, 3-nerved ; 3rd and 4th each enclosing a male flower, ovate-oblong, obtuse, 5-nerved, deeply bifid at the tip, pubescent or pilose, margins silky-ciliate, awn rather long, rising from the back a little distance below the base of the lobes ; 5th similar to the 4th but smaller and much less pubescent, usually glabrous at the base. Palea linear-oblong, 1–2-nerved.—*Handb. N.Z. Fl.* (1864) 322 ; *Cheesem. Man. N.Z. Fl.* (1906) 856.

Auckland and Campbell Islands : Abundant on the hills, *Sir J. D. Hooker, T. Kirk ! Buchanan !* Sea-level to 1400 ft.

The long empty glumes readily separate this from any form of *H. redolens*.

12. **STIPA** Linn. 1735

Tufted perennial grasses. Leaves usually convolute, rarely flat. Spikelets narrow, terete, 1-flowered, in an open or contracted panicle ; rhachilla disarticulating above the 2 outer glumes. Glumes 3 ; the 2 outer empty, usually persistent, keeled, acute, rarely awned ; 3rd or flowering glume rigid, convolute, terete, 5–7-nerved, usually with a bearded callus at the base, tapering upwards into an entire or minutely 2-lobed tip, with a long terminal geniculate awn often spirally twisted below the bend. Palea 2-nerved, enclosed within the flowering glume. Lodicules usually 3, large. Stamens 3, seldom fewer. Styles distinct, rather short. Grain narrow, terete, tightly enclosed by the hardened flowering glume and palea.

A genus of over 100 species, spread over the temperate and tropical regions of both hemispheres. Two of the New Zealand species extend to Australia, the third is endemic.

Tall, 2–5 ft. Panicle 1–2½ ft., lax, nodding. Spikelets minute, $\frac{1}{10}$–⅛ in. Stamen 1	1. *S. arundinacea.*
Densely tufted, 1–3 ft. Leaves long, terete. Panicle 4–9 in., narrow, strict, erect. Spikelets ¾ in.	2. *S. teretifolia.*
Tufted, 1–2 ft. Leaves short, filiform. Panicle 4–8 in., lax, erect. Spikelets ¼ in.	3. *S. setacea.*

(Hk.f.)

1. **S. arundinacea** *Benth. in Journ. Linn. Soc.* xix (1881) 81.—Rhizomes short, creeping, scaly. Culms [illegible] rigid, quite glabr

oryzopsis rigida (Richard) Zotov Trans 75 : 235.
Agrostis rigida Rich. 1832 p. 124 n. 191.

the culms, the lowermost reduced to appressed sheaths, upper 6–12 in. long, $\frac{1}{8}$–$\frac{1}{5}$ in. broad, coriaceous, flat or involute, margins and midrib slightly scaberulous; sheaths very long, closely appressed, finely ciliate along the margins; ligules short, truncate. Panicles very large and lax, nodding, 1–2½ ft. long; rhachis very slender, glabrous; branches in distant whorls of 5–8, capillary, again compound, spreading, finely scaberulous, 3–6 in. long. Spikelets minute, $\frac{1}{10}$–$\frac{1}{8}$ in. long, greenish-purple. Two outer glumes almost equal, lanceolate, acuminate, membranous, scaberulous along the keel, lower 1-nerved, upper 3-nerved; 3rd or flowering glume much shorter, sessile on a short glabrous callus, rigid, convolute, pubescent towards the tip; awn slender, scabrid, deciduous, about $\frac{1}{3}$ in. long. Palea linear-oblong, 2-nerved. Stamen 1.—*Cheesem. Man. N.Z. Fl.* (1906) 857. Apera arundinacea *Hook. f. Fl. Nov. Zel.* i (1853) 295, t. 67; *Handb. N.Z. Fl.* (1864) 326; *Buch. N.Z. Grasses* (1879) t. 17. A. purpurascens *Col. in Trans. N.Z. Inst.* xxi (1889) 106. Benth. 1881. p. 89.

North and South Islands: Auckland—East Cape, *Bishop Williams.* Hawke's Bay—Petane, *A. Hamilton!* Dannevirke and Cape Turnagain, *Colenso!* Wellington—Wairarapa, *Buchanan!* near Masterton, *W. Townson!* South Karori, *T. Kirk.* Nelson—Foxhill, Wangapeka, *T. F. C.* Marlborough—Picton Water Reserve, *J. H. Macmahon;* Pelorus Valley, *Rutland!* Canterbury—Banks Peninsula, at Pigeon Bay and Long Bay, *R. M. Laing!* Akaroa, *Raoul, T. Kirk!* Rakaia Gorge, *H. H. Allan.* Otago—Near Dunedin, *Buchanan! Petrie! Thomson!* Horse Ranges and Kaitangata, *Petrie.* Sea-level to 1500 ft.

A very handsome species. It is closely allied to *S. verticillata* Nees (*Streptachne ramosissima* Trin.), an Australian species which is often grown in gardens, and which has established itself in several localities, but which differs in the rather larger spikelets with a much longer persistent awn, and in having 3 stamens.

see Kirk. Trans 14 : 1882 : 385

2. **S. teretifolia** *Steud. Syn. Pl. Gram.* (1855) 128.—Culms densely tufted, forming large tussocks, rigid, erect, smooth and polished, quite glabrous, 1½–3 ft. high. Leaves longer or shorter than the culms, slender, smooth, rigid, terete, about $\frac{1}{30}$ in. diam., tips acicular; sheaths long, margins scarious; ligules membranous, entire. Panicle narrow, strict, erect, 4–9 in. long; rhachis smooth; branches few, erect, capillary, and with the pedicels glabrous. Spikelets narrow, about $\frac{3}{4}$ in. long without the awn. Two outer glumes subequal, lanceolate, acuminate, finely 3-nerved, membranous, pale whitish-green; 3rd or flowering glume much shorter, rigid and convolute, lanceolate, acuminate, densely clothed with long silky hairs, shortly bifid at the apex; awn from between the lobes, often over 1 in. long, curved or abruptly bent, minutely pubescent. Palea $\frac{3}{4}$ the length of the flowering glume, linear, silky, 2-nerved. Stamens 3.—*Benth. Fl. Austral.* vii (1878) 567; *Cheesem. Man. N.Z. Fl.* (1906) 857. Dichelachne stipoides *Hook. f. Fl. Nov. Zel.* i (1853) 294, t. 66; *Handb. N.Z. Fl.* (1864) 325; *Buch. N.Z. Grasses* (1879) t. 14.

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3. **S. setacea** *R. Br. Prodr.* (1810) 174.—Culms tufted, slender, wiry, erect, glabrous, 1–2 ft. high. Leaves numerous towards the base of the culms and much shorter than them, very slender, almost filiform, erect, smooth, involute; sheaths closely appressed, smooth; ligules narrow,

membranous. Panicle lax, strict, erect, glabrous, 4–8 in. long; rhachis smooth; branches whorled, capillary, each with 2–5 spikelets; pedicels minutely scaberulous. Spikelets $\frac{1}{4}$ in. long without the awn, pale whitish-green. Two outer glumes almost equal, lanceolate, acuminate, very thin and membranous, almost hyaline, glabrous; 3rd or flowering glume much shorter, rigid, convolute, brownish, densely villous, entire at the tip; awn very slender, glabrous, 1–1$\frac{1}{2}$ in. long. Palea linear, silky, 2-nerved. Stamens 3.—*Hook. f. Fl. Tasm.* ii (1860) 110, t. 157B; *Benth. Fl. Austral.* vii (1878) 568; *T. Kirk in Trans. N.Z. Inst.* xiv (1882) 386; *Petrie in Trans. N.Z. Inst.* xix (1887) 326; *Cheesem. Man. N.Z. Fl.* (1906) 858. S. Petriei *Buch. N.Z. Grasses* (1879) t. 17, ii.

SOUTH ISLAND: Otago—Cromwell, Kurow, Duntroon, and other localities in the interior of Otago, *Petrie!* 500–1500 ft.

A common Australian plant, stretching from Queensland to Tasmania. It is probably naturalized in New Zealand.

13. **ECHINOPOGON** Beauv.

An erect or ascending glabrous grass. Leaves flat. Spikelets 1-flowered, crowded in a short and dense spike-like panicle; rhachilla disarticulating above the 2 outer glumes, produced beyond the flower into a short bristle. Glumes 3; 2 outer subequal, persistent, empty, awnless, keeled, acute; 3rd or flowering glume broad, thin, 5-nerved, 3-lobed at the tip, the lateral lobes short and acute, the middle one produced into a straight stiff awn. Palea shorter than the flowering glume, narrow, 2-nerved. Lodicules 2. Stamens 3. Styles distinct; stigmas shortly plumose. Grain free within the flowering glume.

The genus is confined to the following species, which has a wide range in Australia as well as in New Zealand.

1. **E. ovatus** *Beauv. Agrost.* (1812) 42, t. 9.—Culms laxly tufted, decumbent at the base, erect above, slender, stiff, minutely scabrid above, 9–24 in. high. Leaves 1–6 in. long, $\frac{1}{8}$–$\frac{1}{4}$ in. broad, flat, striate, margins and both surfaces harsh and scabrid; sheaths rather long, closely appressed, deeply striate, scabrid with reversed projections; ligule short, membranous, lacerate. Spike-like panicle varying in size from $\frac{1}{2}$–1$\frac{1}{2}$ in. long, ovoid-globose to narrow-oblong, bristling with the long awns; branches short, densely packed. Spikelets compressed, $\frac{1}{10}$–$\frac{1}{8}$ in. long without the awns. Two outer glumes subequal, lanceolate, acute, sharply keeled, keel very prominent, green, ciliate; 3rd or flowering glume equalling or slightly exceeding the empty glumes, broad, furnished at the base with a pencil of silky hairs, awn rigid, scabrous, $\frac{1}{4}$–$\frac{1}{3}$ in. long. Palea linear-oblong, 2-nerved, with a hairy bristle-like continuation of the rhachilla at its back.—*Hook. f. Fl. Nov. Zel.* i (1853) 298; *Handb. N.Z. Fl.* (1864) 325; *Benth. Fl. Austral.* vii (1878) 599; *Buch. N.Z. Grasses* (1879) t. 13B; *Cheesem. Man. N.Z. Fl.* (1906) 859. Agrostis ovata *Forst. f. Prodr.* (1786) n. 40; *A. Rich. Fl. Nouv. Zel.* (1832) 128; *A. Cunn. Precur.* (1836) 247; *Raoul Choix* (1846) 39. Cinna ovata *Kunth Rev. Gram.* i (1829) 208. Hystericina alopecuroides *Steud. Syn. Pl. Gram.* (1855) 35.

NORTH AND SOUTH ISLANDS: Not uncommon in dry places throughout. Sea-level to 2500 ft.

14. **ALOPECURUS** Linn. 1735

Annual or perennial grasses. Leaves flat. Spikelets strongly laterally compressed, 1-flowered, densely crowded in a cylindric spike-like panicle, articulated on the top of the very short pedicels. Glumes 3; the 2 outer subequal, often connate below, sharply keeled, acute or obtuse, not awned, often fringed on the keels; 3rd or flowering glume about as long as the outer glumes, convolute, hyaline, usually with a slender bent dorsal awn. Palea generally wanting. Lodicules absent. Stamens 2 or 3. Styles distinct or connate. Grain laterally compressed, free within the flowering glume and palea.

Species about 20, in the temperate and cool regions of both hemispheres, several of them excellent fodder-grasses. The single New Zealand species is widely distributed.

E? 1. **A. geniculatus** *Linn. Sp. Plant.* (1753) 60.—Culms creeping and rooting at the base, erect above, rather slender, glabrous, 9–18 in. high. Leaves short, soft, flat, $\frac{1}{8}$–$\frac{1}{6}$ in. broad; upper sheaths long, grooved, more or less inflated; ligules long, membranous. Spike 1–2 in. long, $\frac{1}{4}$–$\frac{1}{3}$ in. broad, dense, cylindric, greenish-yellow; branches short, the ultimate [illegible] Spikelets numerous, closely imbricating, connate at along the ones, thin, twice the hers linear, . *Fl.* (1864) 879) t. 5;

Alopecurus geniculatus, Linn.

not native to N.Z. see T.N.Z.I.

vol. 57, p. 61. (Ckn. & Allan).

NORTH ISLAND: Auckland—Lower Waikato, *T. Kirk!* [illegible] pe, *T. F. C.*; East Cape district, *Bishop Williams!* Hawke's Bay—*Colenso!* Wellington—Wairarapa, *Buchanan!* near Wellington, *T. Kirk!* SOUTH ISLAND: Not uncommon in marshy places throughout. Sea-level to 3500 ft. *Marsh Foxtail.*

An abundant grass in marshy places in most temperate regions. The allied species *A. pratensis* (Meadow Foxtail) and *A. agrestis* (Slender Foxtail), descriptions of which will be found in any British Flora, have become naturalized in several localities in both Islands.

15. **SPOROBOLUS** R. Br. 1810

Annual or perennial grasses, of very various habit. Leaves flat or convolute. Spikelets small, often minute, 1-flowered, awnless, arranged bscurely ower or 2 outer g glume ; as the icules 2, e flower-

Sporobolus indicus, RBr.

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vol. 57, p. 68. (Ckn. & Allan).

s of both

mispheres, but most numerous in America.

Ex. 1. **S. indicus** *R. Br. Prodr.* (1810) 170.—Perennial. Culms tufted, stout, rigid, perfectly glabrous, 1–2 ft. high. Leaves mostly at the base of the culms and shorter than them, 4–12 in. long, $\frac{1}{12}$–$\frac{1}{8}$ in. broad, usually

S. capensis Kunth. Enum. Pl. i: 212: 1833

see N.Z. Journ. Sc. & Tech. 15: 1934: 255

membranous. Panicle lax, strict, erect, glabrous, 4–8 in. long; rhachis smooth; branches whorled, capillary, each with 2–5 spikelets; pedicels minutely scaberulous. Spikelets ¼ in. long without the awn, pale whitish-green. Two outer glumes almost equal, lanceolate, acuminate, very thin and membranous, almost hyaline, glabrous; 3rd or flowering glume much shorter, rigid, convolute, brownish, densely villous, entire at the tip; awn very slender, glabrous, 1–1½ in. long. Palea linear, silky, 2-nerved. Stamens 3.—*Hook. f. Fl. Tasm.* ii (1860) 110, t. 157B; *Benth. Fl. Austral.* vii (1878) 568; *T. Kirk in Trans. N.Z. Inst.* xiv (1882) 386; *Petrie in Trans. N.Z. Inst.* xix (1887) 326; *Cheesem. Man. N.Z. Fl.* (1906) 858. S. Petriei *Buch. N.Z. Grasses* (1879) t. 17, ii.

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NORTH AND SOUTH ISLANDS: Not uncommon in dry places throughout. Sea-level to 2500 ft.

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Annual or perennial grasses. Leaves flat. Spikelets strongly laterally compressed, 1-flowered, densely crowded in a cylindric spike-like panicle, articulated on the top of the very short pedicels. Glumes 3; the 2 outer subequal, often connate below, sharply keeled, acute or obtuse, not awned, often fringed on the keels; 3rd or flowering glume about as long as the outer glumes, convolute, hyaline, usually with a slender bent dorsal awn. Palea generally wanting. Lodicules absent. Stamens 2 or 3. Styles distinct or connate. Grain laterally compressed, free within the flowering glume and palea.

Species about 20, in the temperate and cool regions of both hemispheres, several of them excellent fodder-grasses. The single New Zealand species is widely distributed.

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North Island: Auckland—Lower Waikato, *H. Carse!* Lake Whangape, *T. F. C.;* East Cape district, *Bishop Williams!* Hawke's Bay—*Colenso!* Wellington—Wairarapa, *Buchanan!* near Wellington, *T. Kirk!* South Island: Not uncommon in marshy places throughout. Sea-level to 3500 ft. *Marsh Foxtail.*

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15. **SOROBOLUS** R. Br. 1810

Annual or perennial grasses, of very various habit. Leaves flat or convolute. Spikelets small, often minute, 1-flowered, awnless, arranged in a narrow spike-like or effuse panicle; rhachilla very short, obscurely jointed above the 2 outer glumes, not produced beyond the flower or very rarely so. Glumes 3, membranous, nerveless or 1–3-nerved; 2 outer unequal, empty, persistent or separately deciduous; 3rd or flowering glume longer than or equalling the 2nd. Palea usually almost as long as the flowering glume, 2-nerved, often splitting between the nerves. Lodicules 2, small. Stamens 2–3. Styles short, distinct. Grain free within the flowering glume and palea; the pericarp lax, usually deciduous.

Species about 80, dispersed through the tropical and subtropical regions of both mispheres, but most numerous in America.

Ex. 1. **S. indicus** *R. Br. Prodr.* (1810) 170.—Perennial. Culms tufted, stout, rigid, perfectly glabrous, 1–2 ft. high. Leaves mostly at the base of the culms and shorter than them, 4–12 in. long, $\frac{1}{12}$–$\frac{1}{8}$ in. broad, usually

S. capensis Kunth. Enum. Pl. i: 212: 1833
see N.Z. Journ. Sc. & Tech. 15: 1934: 255

involute, tapering to a fine point, glabrous, margins smooth; sheaths pale, compressed, often ciliate on the margins; ligules reduced to a ciliate rim. Panicle erect, spike-like, very narrow, 3–9 in. long, sometimes interrupted below; branches short, crowded, erect and appressed to the rhachis. Spikelets very numerous, crowded, $\frac{1}{2}$ in. long. Two outer glumes unequal, the lowest not much more than $\frac{1}{2}$ the length of the 2nd, hyaline, nerveless, or the 2nd 1-nerved; 3rd or flowering glume nearly twice as long as the 2nd, oblong-lanceolate, acute, 1–3-nerved. Palea almost as long as the flowering glume. Stamens usually 2. Grain obovoid or roughly quadrangular, reddish; pericarp thin.—*Benth. Fl. Austral.* vii (1878) 622; *Cheesem. Man. N.Z. Fl.* (1906) 860. S. elongatus *R. Br. Prodr.* (1810) 170; *Hook. f. Fl. Nov. Zel.* i (1853) 295; *Handb. N.Z. Fl.* (1864) 327; *Buch. N.Z. Grasses* (1879) t. 18.

North and South Islands: Lowland districts from the North Cape to Nelson and Marlborough, abundant, especially in the northern part of the North Island. *Ratstail.*

A common grass in all warm countries. Although now presenting all the appearance of a true native, it is certainly introduced into New Zealand. Bishop Williams informs me that it made its first appearance at the Bay of Islands in 1840, shortly after the arrival of a ship called the "Surabayo," which, while on a voyage from Valparaiso to Sydney, laden with horses and forage, put into the Bay of Islands in a disabled state, and was there condemned and her cargo sold. *Erigeron canadensis* and other weeds appeared at the same time.

16. **SIMPLICIA** T. Kirk.

A slender decumbent grass. Leaves flat. Spikelets minute, 1-flowered, solitary and pedicelled on the branches of a slender panicle; rhachilla disarticulating above the 2 outer glumes, produced above the flower into a minute bristle. Glumes 3; 2 outer minute, unequal, empty, hyaline, persistent; 3rd or flowering glume much longer than the outer glumes, oblong-lanceolate, acuminate or shortly awned, keeled, obscurely 1–3-nerved. Palea almost as long as the flowering glume, 2-nerved. Lodicules 2. Stamens 1–3. Styles distinct; stigmas shortly plumose. Grain oblong, free within the flowering glume and palea.

A peculiar monotypic genus, endemic in New Zealand. Professor Hackel considers it to be intermediate between *Sporobolus* and *Agrostis*, differing from the former in the rhachilla being produced beyond the flower, and from the latter in the minute unequal empty glumes, large palea, &c. Mr. Kirk compared it to *Muhlenbergia*. For its original discovery we are indebted to the exertions of Mr. Petrie.

1. **S. laxa** *T. Kirk in Trans. N.Z. Inst.* xxix (1897) 497.—Culms weak, decumbent, very slender, filiform, 8–18 in. long. Leaves 1–4 in. long by $\frac{1}{20}$–$\frac{1}{8}$ in. broad, flat, flaccid, glabrous or minutely ciliate along the nerves; sheaths long, glabrous or pubescent; ligule long, membranous. Panicle very slender, narrow, 2–6 in. long; rhachis filiform; branches few, filiform, erect, smooth or minutely scaberulous. Spikelets lanceolate, pale-green, about $\frac{1}{12}$ in. long. Two outer glumes minute, unequal, glabrous, the lower $\frac{2}{3}$ he length of the upper, which is $\frac{1}{4}$ the length of the flowering glume; 3rd or flowering glume acuminate or shortly awned, pubescent with short stiff erect hairs. Palea almost as long as the flowering glume, acute, pubescent. Ripe grain not seen.—*Cheesem. Man. N.Z. Fl.* (1906) 861; *Ill. N.Z. Fl.* (1914) t. 221.

North Island: Wellington—Dry River, Ruamahanga, Lower Wairarapa, *T. Kirk!* South Island: Otago—Deep Stream, Waikouaiti, *Petrie!*

Zotov: Trans 73: 36. places Poa uniflora Buch. as var. buchananii of Simplicia laxa Muhlenb. 1817: 151.

17. **AGROSTIS** Linn. 1735

Annual or perennial grasses, of very various habit. Leaves usually flat, sometimes setaceous, often flaccid; ligules membranous. Spikelets small, 1-flowered, arranged in effuse or contracted panicles with capillary whorled branches; rhachilla disarticulating above the 2 outer glumes, not produced beyond the flower. Glumes 3; 2 outer equal or subequal, empty, keeled, acute, not awned, usually 1-nerved; 3rd or flowering glume membranous or hyaline, glabrous or hairy, usually truncate, 5-nerved or rarely 3-nerved, with a dorsal awn or unawned, callus glabrous or with a few minute hairs. Palea usually short, often minute or wanting, thin and delicate, hyaline, 2-nerved or nerveless. Lodicules 2. Stamens 3. Styles very short, distinct; stigmas plumose. Grain oblong, free within the flowering glume.

Species about 125, found in all parts of the world, but most abundant in temperate regions, and penetrating as far into the Arctic and Antarctic Zones as any other grasses. Of the 7 species admitted in this work, one is generally distributed in high southern latitudes, two or possibly three are found in Australia, the remainder are endemic.

* Awn of flowering glume distinctly exserted beyond the empty glumes.

Culms 3–18 in. Panicle contracted, 1–4 in. Spikelets $\frac{1}{6}$ in. long; pedicels almost hispid .. .. 1. *A. magellanica.*

** Awn of flowering glume often wanting: when present not exceeding the empty glumes.

Minute, softly pulvinate, seldom more than 1 in. high. Panicle usually sunk among the leaves .. .. 2. *A. muscosa.*

Slender, strict, usually 1-noded, 2–9 in. Panicle narrow, spike-like; spikelets usually purplish .. .. 3. *A. subulata.*

Slender, not so strict, 3-noded, 3–6 in. Panicle more open. Spikelets straw-coloured .. .. 4. *A. pallescens.*

Tufted, 4–18 in.; innovation-shoots intravaginal, without leafless scales at the base. Panicle 2–5 in., contracted, rather dense; branches numerous. Spikelets $\frac{1}{10}$–$\frac{1}{8}$ in., empty glumes scabrid on the keel .. .. 5. *A. Dyeri.*

Laxly tufted, 6–18 in.; innovation-shoots extravaginal, with leafless scales at the base. Panicle 2–6 in., lax; branches in whorls of 3–5. Spikelets $\frac{1}{8}$ in., empty glumes smooth .. .. .. 6. *A. Petriei.*

Weak, very slender, 6–18 in. Panicle 2–6 in., lax and spreading; branches few, capillary, trichotomously divided. Spikelets minute, $\frac{1}{15}$ in. .. .. 7. *A. parviflora.*

Laxly tufted, very slender, 6–15 in. Panicle linear, $1\frac{1}{2}$–4 in. by $\frac{1}{10}$–$\frac{1}{6}$ in.; branches short, erect. Spikelets $\frac{1}{12}$–$\frac{1}{10}$ in., pale, shining .. .. 8. *A. tenella.*

Two common European species, *A. vulgaris* (Red-top) and *A. alba* (Fiorin), are copiously naturalized in most parts of the Dominion. They come nearer to *A. Dyeri* than to any other of the indigenous species, but differ in the creeping rootstocks, laxer panicles, and in the florets having a well-developed palea. Descriptions of them will be found in any British Flora.

1. **A. magellanica** *Lam. Ill.* i (1791) 160.—Culms tufted, very variable in size, 3–18 in. high, erect or shortly decumbent at the base, stout or slender, quite glabrous, leafy. Leaves numerous, shorter than the culms, $\frac{1}{12}$–$\frac{1}{8}$ in. broad, involute, striate, scaberulous on the margins and veins; sheaths long, contracted at the mouth, deeply grooved, pale; ligules oblong, membranous, truncate at the apex, lacerate. Panicle 1–4 in. long, $\frac{1}{4}$–$\frac{3}{4}$ in. broad, contracted, linear-oblong, rather dense, erect or inclined; rhachis stout, scabrid; branches numerous, whorled, erect, scaberulous. Spikelets $\frac{1}{6}$ in. long, light-green or purplish; pedicels usually shorter than the

See Fl. Ant. 1944: 96. A. auckl.
Fl. N.Z. 1853: 296. A. parv. var. perpus.

spikelets, scabrid, thickened at the tips. Two outer glumes subequal, lanceolate, acuminate, ciliate or almost hispid along the keel, sides scaberulous; 3rd or flowering glume ½ the length of the 2nd or rather shorter, membranous, glabrous, truncate at the apex and more or less evidently 4-cuspidate, awn from half-way down the back, straight or flexuous or slightly recurved, usually longer than the spikelet. Palea very short, hardly exceeding the ovary, sometimes wanting.—*Hook. f. Phil. Trans. Roy. Soc.* (1879) 21; *Cheesem. Man. N.Z. Fl.* (1906) 862; *Petrie in Subantarct. Is.* ii (1909) 473. A. antarctica *Hook. f. Fl. Antarct.* ii (1847) 374, t. 132; *Handb. N.Z. Fl.* (1864) 327. A. multicaulis *Hook. f. Fl. Antarct.* i (1844) 95. See Petrie Trans 25: 275

South Island: Otago—Head of Clinton Valley, near Lake Te Anau, *Petrie!* Auckland and Campbell Islands: *Sir J. D. Hooker, T. Kirk! Cockayne! W. R. Chambers!* Antipodes Island: *T. Kirk.* Macquarie Island: Abundant, *A. Hamilton, H. Hamilton.*

Also found in Chile, Fuegia, the Falkland Islands, Kerguelen Island, Marion and Heard Islands. Sir J. D. Hooker, in his memoir on the flora of Kerguelen Island (Phil. Trans. vol. clxviii) has reduced both *A. antarctica* and *A. multicaulis* to *A. magellanica* Lam. Professor Hackel concurs in this, remarking that *A. antarctica* only differs from the typical *A. magellanica* in the less-pointed outer glumes, and that *A. multicaulis* is only a dwarfed state, not separable as a distinct variety.

2. **A. muscosa** *T. Kirk in Trans. N.Z. Inst.* xiii (1881) 385.—Minute, very densely tufted, forming small rounded cushion-like patches 1–2 in. diam., and less than 1 in. high. Culms densely packed, much branched at the base, leafy throughout. Leaves longer or shorter than the culms, pale glaucous-green; blades spreading, flaccid, involute, almost capillary; sheaths shorter or longer than the blades, lax, whitish, membranous, grooved; ligules long, subulate. Panicle very short and dense, often concealed among the leaves, contracted into a close rounded head ⅛–⅙ in. diam., usually many-spiculate, but in depauperated states the spikelets may be reduced to 2–6, or in large states the panicle may be lengthened to ¼–⅓ in.; branches short, sparsely hairy. Spikelets about $\frac{1}{12}$ in. long, pale-green. Two outer glumes subequal, ovate-lanceolate, acute, with a green scabrid keel and thin hyaline margins; 3rd or flowering glume about ¼ shorter, ovate-oblong, truncate, 5-nerved, awn wanting. Palea wanting. Grain broadly oblong.—*Cheesem. Man. N.Z. Fl.* (1906) 863. A. Spencei *T. Kirk in Trans. N.Z. Inst.* xxix (1897) 539 (*name only*). A. aemula *var.* spathacea *Berggr. in Minneskr. Fisiog. Sallsk. Lund.* (1877) 32, t. 7, f. 41–47.

North Island: Omatangi, Lake Taupo, *S. Berggren!* Mount Egmont, *T. F. C.*; Waimarino Plateau and slopes of Tongariro, *T. F. C.*; Lake Rotoaira, *T. Kirk, T. F. C.*; Mount Holdsworth, *W. Townson!* Kaimanawa and Tararua Mountains, *B. C. Aston! T. P. Arnold!* South Island: Nelson—Mount Owen, *T. F. C.*; Tarndale, *Cockayne* and *Foweraker.* Marlborough—Awatere Valley, *Cockayne.* Canterbury—Broken River basin, *J. D. Enys, T. Kirk, T. F. C.*; Mackenzie Plains, *T. F. C.* Otago—Not uncommon in the eastern and southern portions of the province, *Petrie! T. Kirk!* Altitudinal range usually from 1500 to 4500 ft., but descending to sea-level in Southland.

B.M. D'Urville Island 1941 Ashburton Trans 57: 69.

3. **A. subulata** *Hook. f. Fl. Antarct.* i (1853) 95, t. 53.—Culms compactly tufted, slender, strict, erect, smooth, 1–2-noded, the nodes near the base of the culm, 2–9 in. high. Leaves crowded near the base of the culms and usually much shorter than them, very narrow, often filiform, strict, erect, involute, smooth and glabrous; sheaths long, grooved, glabrous; ligules scarious, narrow-oblong. Panicle very narrow, almost spike-like, ½–2 in. long, erect, purplish or pale-green; rhachis smooth or obscurely

scabrid ; branches in fascicles of 2-5, unequal, short, erect, capillary, scabrid. Spikelets about $\frac{1}{10}$ in. long. Two outer glumes slightly unequal, oblong-lanceolate, acute, green or purplish, usually scabrid or ciliate on the keel, but sometimes glabrous, margins thin and hyaline ; 3rd or flowering glume about $\frac{1}{3}$ shorter, thin and membranous, truncate, minutely denticulate, smooth, faintly 5-nerved, awn usually absent but sometimes present from the middle of the back. Palea wanting. Grain oblong.—A. Muelleri *Benth. Fl. Austral.* vii (1878) 576 ; *Cheesem. Man. N.Z. Fl.* (1906) 864. A gelida *F. Muell. in Trans. Vict. Inst.* (1855) 43 (*not of Trin.*). A. canina *var. Hook. f. Handb. N.Z. Fl.* (1864) 328 ; *Buch. N.Z. Grasses* (1879) t. 20, f. A. see Petrie Sub. Is. 2 : 4-73

North Island.—Tongariro and Ruapehu, *T. F. C., Cockayne ;* Ruahine Mountains, *Colenso, A. Hamilton ;* Tararua Mountains, *B. C. Aston !* Mount Hector, *Petrie.* South Island : Common at high altitudes along the central chain of mountains throughout. Auckland and Campbell Islands : *Hooker ! T. Kirk, F. R. Chapman.*

Very closely allied to *A. Dyeri*, and mainly distinguished by its much smaller size, narrower panicle, and different habit. The stems are generally 1-noded, whereas they are usually 2–3-noded in *A. Dyeri*. I agree with Mr. Petrie in considering that it is identical with Hooker's *A. subulata*, originally described from immature specimens collected on Campbell Island.

4. **A. pallescens** *Cheesem. in Trans. N.Z. Inst.* liii (1921) 423.—Annual, densely tufted and often forming a close sward, pale straw-coloured. Culms 3–6 in. high, slender, smooth, erect, 3-noded, the uppermost node high up the culm. Leaves numerous towards the base of the culms and shorter than them, very narrow, almost filiform, smooth or very minutely scabrid, erect or somewhat spreading ; sheaths long, deeply grooved ; ligule thin, scarious. Panicle narrow, but not so much so as *A. subulata*, lanceolate or ovate-lanceolate, $\frac{1}{2}$–1 in. long, straw-coloured ; branches in fascicles of 2–4, unequal in length, somewhat spreading, finely scabrid. Spikelets $\frac{1}{12}$–$\frac{1}{10}$ in. long. Two outer glumes slightly unequal, oblong-lanceolate, subacute, membranous, scabrid on the keel ; margins thin ; 3rd or flowering glume about $\frac{1}{3}$ shorter, thin and membranous, hyaline, truncate, faintly 5-nerved ; awn wanting. Palea wanting. Grain oblong.—A. Muelleri *var.* paludosa *Hack. in Cheesem. Man. N.Z. Fl.* (1906) 864.

South Island : Swamps near Broken River, *T. Kirk !* swamps in Tasman Valley, not uncommon, *T. F. C.* 1500–2500 ft.

Near to *A. subulata*, but amply distinct in its 3-noded culms, the upper node of which is sometimes situated quite $\frac{1}{3}$ of the way up the culm, in the straw-coloured spikelets, and in the broader and more open panicles. In *A. subulata* the culms are seldom more than 1-noded, the node being placed near the base of the culm, the panicles are narrow and spike-like, and usually purplish in colour. In addition to the above, *A. subulata* is always found on the steep rocky slopes of mountains, never in swamps. 71 (1941) 83.

5. **A. Dyeri** *Petrie in Trans. N.Z. Inst.* xxii (1890) 441.—Perennial ; innovation-shoots intravaginal, not clothed at the base with leafless scales. Culms tufted, 4–18 in. high, slender, erect or geniculate at the base, glabrous, 2–3-noded, the upper node considerably below the culm. Leaves shorter than the culms, $\frac{1}{12}$–$\frac{1}{8}$ in. broad, flat or convolute when dry, striate, scaberulous on the margins and both surfaces ; sheaths terete, grooved, glabrous, the upper long ; ligules oblong, obtuse, membranous, lacerate. Panicle elongated, usually from 2 to 5 in. long, but shorter in depauperated forms, erect, usually more or less contracted, rarely open, green or brownish-green ; rhachis slender, scaberulous above ; branches in rather

distant fascicles placed alternately on opposite sides of the rhachis, strict, erect, capillary, scaberulous, simple or branched from the base or above; pedicles longer or shorter than the spikelets. Spikelets $\frac{1}{10}$–$\frac{1}{8}$ in. long. Two outer glumes subequal, lanceolate, acute, 1–3-nerved, scabrid on the keel; 3rd or flowering glume about $\frac{1}{3}$ shorter than the 2nd, oblong, truncate, minutely 4-toothed, awnless. Palea wanting. Anthers small.—*Cheesem. Man. N.Z. Fl.* (1906) 864; *Ill. N.Z. Fl.* ii (1914) t. 222. A. canina *Hook. f. Fl. Nov. Zel.* i (1853) 296; *Handb. N.Z. Fl.* (1864) 328; *Buch. N.Z. Grasses* (1879) t. 19 (*not of Linn.*). A. parviflora *Buch. N.Z. Grasses* (1879) t. 20c (*not of R. Br.*).

Var. **aristata** *Hack. MS.*—Flowering glume awned. Other characters as in the type.

Var. **delicatior** *Hack. MS.*—More slender. Panicle broader, much more lax. Spikelets $\frac{1}{3}$ smaller. Flowering glume awned.

North and South Islands: Mountain districts from the East Cape, Taupo, and Mount Egmont southwards, abundant. Stewart Island: Not uncommon, *Cockayne.* 1000–5000 ft.

Closely allied to the northern *A. canina* Linn., to which it was originally referred by Sir J. D. Hooker. But it differs from all the forms of *A. canina*, as has been pointed out by Professor Hackel, in the innovation-shoots being always intravaginal, in the more scabrid leaves, in the narrower and more contracted panicles, and in the rather larger spikelets. It usually constitutes a large proportion of the alpine pastures in elevated districts in both Islands.

6. **A. Petriei** *Hack. in Trans. N.Z. Inst.* xxxv (1903) 379.—Perennial; innovation-shoots extravaginal, clothed at the base with leafless scales gradually increasing in size. Clums tufted, slender, erect, 6–18 in. high, glabrous, 3–5-noded, upper node almost at the middle of the culm. Leaves 2–5 in. long, $\frac{1}{15}$–$\frac{1}{12}$ in. broad, linear, acute, flat or convolute when dry, glaucous, scabrid on the margins and both surfaces; sheaths terete, glabrous; ligules long, oblong, obtuse, denticulate. Panicle 2–6 in. long, oblong, open, lax-flowered; rhachis smooth; branches in whorls of 3–5, capillary, scaberulous, again branched; pedicels hardly thickened at the tips, about equal in length to the spikelets. Spikelets linear-lanceolate, $\frac{1}{8}$ in. long, pale-green. Two outer glumes equal, lanceolate, acute, I-nerved, smooth; 3rd or flowering glume $\frac{1}{4}$ shorter, thin and membranous, obtuse, minutely denticulate, 5-nerved; awn from the middle of the back, straight, about as long as the empty glumes, rarely wanting, callus set with short hairs. Palea wanting. Anthers large.—*Cheesem. Man. N.Z. Fl.* (1906) 865.

Var. **mutica** *Hack. MS.*—Awn wanting.

South Island: Otago—Cromwell, Nevis Valley, Dunstan Mountains, *Petrie!* Lake Wakatipu, *T. Kirk!* 1000–2500 ft.

According to Professor Hackel this is nearest to *A. canina*, which differs in its bright-green smooth leaves, much more compound and closer panicle, smaller spikelets, in the scabrid keel of the empty glumes, and small anthers. *A. Dyeri* is separated by the innovation-shoots being intravaginal and not clothed with leafless scales, to say nothing of the broader leaves, dense panicle, and spikelets with the empty glumes scabrid on the keel.

7. **A. parviflora** *R. Br. Prodr.* (1810) 170.—Culms laxly tufted, very slender, weak, often decumbent or prostrate at the base, erect or ascending above, quite smooth, 6–18 in. long. Leaves chiefly towards the base of the culms, the lowermost soon withering, 2–6 in. long, usually narrow and often almost filiform, but in luxuriant specimens broader and sometimes

$\frac{1}{12}$–$\frac{1}{10}$ in. diam., flaccid, flat or involute, smooth or the margins minutely scabrid; sheaths long, grooved, quite smooth; ligules long, membranous, lacerate. Panicle varying in length from 2 to 6 in. or more, compound, very lax and slender, drooping; primary branches long, capillary, scaberulous, erect at first but soon spreading, trichotomously divided, lowermost in clusters of 4–6, upper in distant pairs; secondary branches from above the middle, again divided; pedicels thickened at the tips. Spikelets very minute, about $\frac{1}{15}$ in. long, shining, pale-green, sometimes tinged with purple. Two outer glumes slightly unequal, lanceolate, acute, membranous, slightly scabrid on the keel, margins hyaline; 3rd or flowering glume about $\frac{1}{4}$ shorter, broad, truncate, hyaline, delicately 5-nerved, awnless. Palea wanting.—*Hook. f. Fl. Nov. Zel.* i (1853) 296; *Handb. N.Z. Fl.* (1864) 328; *Cheesem. Man. N.Z. Fl.* (1906) 866. A. scabra *Benth. Fl. Austral.* vii (1878) 576 (*not of Willd.*).

North Island: Inland Patea and shores of Cook Strait, *Colenso!* South Island: Pelorus Valley, *J. H. Macmahon!* near Westport, *W. Townson!* near Dunedin, *Petrie!*

Since the publication of the first edition of this work I have obtained no fresh information respecting this plant, which can be recognized without much difficulty by the weak habit, very slender lax spreading panicle, and minute spikelets, which are smaller than those of any other New Zealand species. It was originally referred to *A. parviflora* by Hooker in the Flora, but does not quite match the plate of that species given in the "Flora Tasmanica" (t. 158), nor any Australian specimens that I have seen. Bentham referred the Australian plant to *A. scabra* Willd., a North American species; but that is a larger and more erect plant, with a more copiously divided panicle, and with narrower spikelets, much more scabrid on the keel. Professor Hackel, who has examined my specimens, says, "Not easy to name. Surely not *A. scabra* Willd., but very near the North American *A. perennans* Tuck. It is most probably *A. parviflora* R. Br., but without seeing one of Brown's types I cannot be quite sure of the identity." It should be mentioned that most of the specimens referred to *A. parviflora* by New Zealand botanists are nothing but small states of *A. Dyeri* Petrie (the *A. canina* of the Handbook), as, for instance, the plant figured as *A. parviflora* by Buchanan in his New Zealand Grasses, t. 20c. All such specimens can be at once distinguished by the strict habit, contracted panicle, and larger spikelets.

8. **A. tenella** *Petrie in Trans. N.Z. Inst.* xxii (1890) 442.—Apparently annual. Culms laxly tufted, erect, very slender, quite smooth and glabrous, 3–4-noded, 6–15 in. high. Leaves few, much shorter than the culms, erect, very narrow, filiform or setaceous, involute, finely striate; sheaths rather long, close, smooth; ligules oblong, obtuse, lacerate. Panicle very long and narrow, 1½–4 in. by $\frac{1}{10}$–$\frac{1}{6}$ in. broad, erect, pale-green; rhachis minutely scaberulous; branches few, fascicled, very short, erect; pedicels short, capillary, scaberulous. Spikelets $\frac{1}{12}$–$\frac{1}{10}$ in. long, pale. Two outer glumes subequal, lanceolate, acute, shining, 1-nerved, slightly scabrid on the keel, smooth on the sides; 3rd or flowering glume about $\frac{1}{4}$ shorter, ovate-lanceolate, thin and hyaline, truncate, minutely denticulate, glabrous, faintly 5-nerved, awn wanting. Grain oblong.—*Cheesem. Man. N.Z. Fl.* (1906) 866.

South Island: Canterbury—Broken River, *Petrie!* Porter River, *T. Kirk!* Otago—Macrae's, Lake Wakatipu, *Petrie!* 1000–3000 ft.

A very distinct species, easily recognized by the very slender habit, excessively narrow pale-green panicle, and small shining spikelets.

18. **DEYEUXIA** Clarion.

Annual or perennial grasses. Leaves flat or involute; ligules membranous. Spikelets small, 1-flowered, arranged in effuse or contracted or spike-like panicles with capillary whorled branches; rhachilla disarticulating above the 2 outer glumes, produced beyond the flower into a silky

bristle. Glumes 3; 2 outer equal or subequal, persistent, empty, keeled, acute, not awned, usually 1-nerved; 3rd or flowering glume shorter than the empty glumes or equalling them, thin and hyaline or rigidly membranous or almost coriaceous, 5-nerved, entire or 2–4-dentate, callus at the base silky; awn generally present, straight or twisted, inserted above or below the middle of the glume. Palea more than half as long as the flowering glume or almost equalling it, thin, 2–nerved or 2-keeled. Stamens 3. Styles distinct, short; stigmas plumose. Grain oblong or obovoid, enclosed within the flowering glume and palea.

Species over 100, widely dispersed throughout the temperate regions of both hemispheres, particularly abundant in Andine South America. It is not at all easy to separate *Deyeuxia* from the allied genera *Agrostis* and *Calamagrostis*, and of late many authors, including Hackel, have placed the majority of the species under the latter genus. But it has always appeared to me that for taxonomic purposes it is desirable to have a genus intercalated between the typical species of *Agrostis* on the one side and *Calamagrostis* on the other. In the first edition of this work I therefore followed the arrangement proposed in Hooker's "Flora of British India" (vol. vii, p. 253), where *Agrostis* is limited to species in which the rhachilla is not produced at the back of the flower, and in which the callus of the flowering glume is naked or nearly so, *Calamagrostis* containing those in which there is also no prolongation of the rhachilla, but which have the callus villous with long hairs, while in *Deyeuxia* the species have both an elongated rhachilla and hairy callus. Further study has convinced me that this course is much to be preferred, particularly as there are no genuine species of *Calamagrostis* in New Zealand as originally limited. As defined above, there are 7 New Zealand species of the genus, 3 of which extend to Australia and Tasmania, the remaining 4 being endemic.

* Flowering glume $\frac{1}{3}$–$\frac{1}{2}$ shorter than the empty glumes, thin and hyaline. Panicle very broad and lax; branches long, spreading, capillary.

Spikelets $\frac{1}{12}$–$\frac{1}{8}$ in. Flowering glume silky, truncate, minutely 4-denticulate; awn from the middle of the back	1. *D. Forsteri.*
Spikelets $\frac{1}{12}$–$\frac{1}{10}$ in. Flowering glume quite glabrous. Awn short	2. *D. glabra.*
Spikelets $\frac{1}{5}$–$\frac{1}{4}$ in. Flowering glume silky at the base only, 2 lateral nerves produced into short awns, dorsal awn from below the middle of the back	3. *D. Billardieri.*

** Flowering glume not much shorter than the empty glumes, rigidly membranous. Panicle narrow, contracted.

Slender, 4–12 in. Leaves filiform. Panicle 1–2½ in. Spikelets $\frac{1}{8}$ in. long; callus-hairs very long	4. *D. setifolia.*
Slender, 9–36 in. Leaves narrow, involute. Panicle 2–5 in. Spikelets $\frac{1}{6}$–$\frac{1}{4}$ in.; awn from below the middle, exserted; callus-hairs short. Rhachilla obviously produced	5. *D. avenoides.*
Tall, slender, 2–4 ft. Leaves flat, $\frac{1}{6}$–$\frac{1}{4}$ in. broad. Panicle 4–6 in. Spikelets $\frac{1}{6}$–$\frac{1}{4}$ in.; awn short, almost terminal. Rhachilla obviously produced	6. *D. Youngii.*
Tall, stout or slender, 1–3 ft. Leaves flat or involute. Panicle 2–6 in. Spikelets $\frac{1}{8}$ in.; flowering glume 4-cuspidate; awn from near the base. Rhachilla not produced or very obscurely so	7. *D. quadriseta.*

D. fil: formis (Forst. f.) Hook. f. 1817: 266.

1. **D. Forsteri** *Kunth Rev. Gram.* i (1829) 77.—Annual or rarely perennial, very variable in size and habit. Culms tufted, erect or decumbent at the base, slender, smooth, 2–4-noded, 6–24 in. high. Leaves shorter than the culms, very narrow and involute or broader and flat, $\frac{1}{12}$–$\frac{1}{6}$ in. diam., almost glabrous or scaberulous on the margins and principal veins; sheaths smooth, grooved, the uppermost usually long; ligules long, narrow, membranous. Panicle 3–12 in. long, usually very lax and spreading when mature, but contracted in the young state; branches in distant whorls or clusters, the lowermost 2–6 in. long or more, repeatedly trichotomously divided, finely capillary, scabrid; pedicels very slender. Spikelets numerous,

pale-green, $\frac{1}{12}$–$\frac{1}{8}$ in. long. Two outer glumes subequal, lanceolate, acuminate, membranous, 1-nerved, keel scabrid; 3rd or flowering glume $\frac{1}{3}$–$\frac{1}{2}$ shorter, oblong, truncate, minutely 4-denticulate, hyaline, more or less silky on the sides and with a tuft of hairs at the base; awn from the middle of the back, slender, straight or bent. Palea narrow-linear, bifid at the apex. Rhachilla usually produced behind the palea as a short silky bristle, but often very small and hardly perceptible.—*Hook. f. Fl. Nov. Zel.* i (1853) 298; *Benth. Fl. Austral.* vii (1878) 579; *Buch. N.Z. Grasses* (1880) t. 21; *Cheesem. Man. N.Z. Fl.* (1906) 868. Avena filiformis *Forst. f. Prodr.* (1786) n. 46. Agrostis avenacea *Gmel. Syst.* i (1791) 171. A. Forsteri *Roem. and Schult. Syst.* ii (1817) 359; *A. Rich. Fl. Nouv. Zel.* (1832) 131; *A. Cunn. Precur.* (1836) n. 253; *Raoul Choix* (1846) 39. A. aemula *R. Br. Prodr.* (1810) 172; *Hook. f. Handb. N.Z. Fl.* (1864) 329; *Buch. N.Z. Grasses* (1879) t. 21. A. Solandri *F. Muell. Veg. Chat. Is.* (1864) 60. see Petrie Trans 49: 55 also Sub Is. 2:474. Skottsb. Småins Medd Gtanden 163 s Veg. Easter Is

North and South Islands, Stewart Island, Chatham Islands, Subantarctic Islands: Abundant throughout, from sea-level to 4000 ft. Easter Id.

Var. **pilosa** *Cheesem.*—Coarser and more robust. Leaves broader, $\frac{1}{4}$–$\frac{1}{3}$ in. or even more, flat. Spikelets slightly larger.—D. pilosa *Buch. N.Z. Grasses* (1880) 6. Agrostis pilosa *A. Rich. Fl. Nouv. Zel.* (1832) 134, t. 23; *Raoul Choix* (1846) 39; *Hook. f. Fl. Nov. Zel.* i (1853) 297; *Handb. N.Z. Fl.* (1864) 329; *Buch. N.Z. Grasses* (1879) t. 22.

North and South Islands: Damp subalpine localities, not uncommon. Hardly more than a luxuriant state of the type.

Var. **semiglabra** *Hack. MS.*—Flowering glume glabrous on the back, its callus sparingly pilose. Otherwise as in the type.

North and South Islands: Not uncommon.

Var. **humilior** *Hack. MS.*—Root often perennial. Culms 3–10 in. high. Panicle very broad and spreading; branches few, distant, binate, few-flowered.—A. striata *Col. in Trans. N.Z. Inst.* xxi (1889) 107.

North and South Islands: Probably not uncommon in mountain districts, Lake Waikaremoana, *Hill!* Clarence Valley, Lake Tennyson, Broken River, Tasman Valley, &c., *T. F. C.*; Lake Te Anau, *Petrie!*

Var. **littoralis** *Hack. MS.*—Root annual. Culms 2–9 in., often forming a compact sward. Panicle rather narrow, contracted, many-flowered. Empty glumes linear-lanceolate, narrower than in the type.

Kermadec Islands, North and South Islands: Rocky or gravelly places near the sea, not uncommon.

Var. **Lyallii** *Hack. MS.*—Culms 6–12 in. Leaves narrow, involute. Panicle lax; branches few, binate or ternate. Spikelets larger, $\frac{1}{3}$–$\frac{1}{2}$ in. long. Flowering glume densely clothed with silky hairs.—A. Lyallii *Hook. f. Fl. Nov. Zel.* i (1853) 297.

South Island: Near Westport, *W. Townson!* Okarito, *A. Hamilton!* Jackson's Bay, *T. Kirk!* Milford Sound, *Lyall, T. Kirk!* Catlin's River, *Petrie!* Auckland Islands: *T. Kirk!*

Var. **micrathera** *Hack. MS.*—Habit of var. *Lyallii*, but larger and leaves broader. Spikelets still larger, $\frac{1}{3}$–$\frac{1}{2}$ in. long. Empty glumes linear-lanceolate, acuminate. Flowering glume short, $\frac{1}{3}$ as long as the empty glumes, very thin, sparingly silky; awn from above the middle, short, delicate, hardly exserted beyond the empty glumes.

Antipodes Island, Campbell Island: *T. Kirk!* Possibly the same as *Agrostis leptostachya* Hook. f. Fl. Antarct. i (1844) 94, but I have not seen an authenticated specimen, and it is described as having no palea and a long awn.

D. Forsteri is one of the most generally diffused plants in New Zealand, and is certainly one of the most variable. In attempting to characterize its chief forms I have mainly followed the grouping suggested to me by Professor Hackel, who has kindly examined sets of all the varieties contained in my herbarium. The species is as plentiful in Australia and Tasmania as in New Zealand. As the earliest name of this plant is undoubtedly Forster's *Avena filiformis*, Dr. Cockayne, in his florula of Stewart Island (p. 49), has changed the specific name to *filiformis*. But this is inadmissible, as a valid earlier name of *filiformis* has already been used in both *Calamagrostis* and *Deyeuxia*. (*Calamagrostis filiformis* Griseb. in Goett. Nachr. (1868) 78; *Deyeuxia filiformis* Hook. f. Fl. British India, vii (1897) 268.)

2. **D. glabra** *Petrie in Trans. N.Z. Inst.* xlvi (1914) 36.—Smooth, slender, laxly tufted, sparingly branched from the base. Culms 6–12 in. long, slender, weak, sparingly leafy. Leaves remote, the upper ones the longest, the lower gradually reduced in size; smooth, flat, striate, bright-green. Sheaths long, grooved; ligules long, narrow, membranous, lacerate at the tip. Panicle usually lax and spreading when mature, contracted in the young state; branches in distant whorls or clusters, finely capillary, minutely scaberulous. Spikelets few, on very slender pedicels, small, $\frac{1}{12}$–$\frac{1}{10}$ in. long, pale-green. Two outer glumes subequal, lanceolate, acute, membranous, faintly 1-nerved, finely scabrid or ciliate on the keel; 3rd or flowering glume $\frac{1}{3}$–$\frac{1}{2}$ shorter, oblong, truncate and denticulate at the tip, quite glabrous, membranous, faintly 3-nerved; awn short, slender, barely equalling the tip of the outer glumes. Palea narrow-linear, bifid at the apex. Rhachilla short, sparingly pilose.

South Island: Moist places near the sea at Bluff and Fortrose, Southland, *Petrie!*

Mr. Petrie states that this can be "readily distinguished from *D. Forsteri* by the glabrous flowering glumes, the short delicate awn, and the absence of a tuft of hairs at the base of the flowering glume." But I think there can be little doubt that it is only a variety of *D. Forsteri* in which the hairs at the base of the flowering glume are absent. There are no other points of difference of any importance, and it is well known that the hairs on the flowering glume of *Deyeuxia* form a very variable character.

3. **D. Billardieri** *Kunth Rev. Gram.* i (1829) 77.—Culms tufted, usually rather stout, erect or decumbent at the base, 9–18 in. high, leafy throughout. Leaves shorter than the culms, $\frac{1}{4}$–$\frac{1}{2}$ in. broad, flat, striate, usually scabrid on the margins and veins; sheaths rather narrow, rough, the uppermost very long, usually enclosing the culm up to the base of the panicle; ligules long, membranous, lacerate. Panicle 4–12 in. long, very broad and lax, often as broad as long when fully expanded; branches numerous, in regular whorls, long, capillary, scabrid, trichotomously divided; pedicels thickened at the tips. Spikelets $\frac{1}{5}$–$\frac{1}{4}$ in. long, green or purplish. Two outer glumes slightly unequal, narrow-lanceolate, acuminate, 1-nerved or 3-nerved with the lateral veins very short, scabrid on the keel and sides; 3rd or flowering glume $\frac{1}{4}$–$\frac{1}{3}$ shorter, oblong, truncate, silky at the base, 5-nerved, the 2 lateral nerves produced on each side into short awns, the 2 outer of which are longer than the 2 inner; dorsal awn from below the middle, straight or bent, usually exceeding the spikelet. Palea about $\frac{2}{3}$ as long as the flowering glume, linear, 2-nerved. Rhachilla produced into a silky bristle almost as long as the palea.—*Hook. f. Fl. Nov. Zel.* i (1853) 298; *Benth. Fl. Austral.* vii (1878) 580; *Buch. N.Z. Grasses* (1880) 6; *Cheesem. Man. N.Z. Fl.* (1906) 869; *Ill. N.Z. Fl.* ii (1914) t. 223. Agrostis Billardieri *R. Br. Prodr.* (1810) 171; *A. Rich. Fl. Nouv. Zel.* (1832) 130; *A. Cunn. Precur.* (1836) n. 252; *Raoul Choix* (1846) 39; *Hook. f. Handb. N.Z. Fl.* (1864) 329; *Buch. N.Z. Grasses* (1879) t. 23. Calamagrostis Billardieri *Cockayne in Bot. Stewart Is.* (1909) 49.

Var. **tenuis** *Petrie MS.*—Smaller and much more slender. Leaves narrow, involute. Panicle smaller, with fewer branches. Spikelets rather smaller.

North and South Islands, Chatham Islands, Stewart Island: Abundant throughout in rocky or sandy places near the sea. Inland at Te Aroha, Upper Thames Valley. Var. *tenuis:* Catlin's River, Otago, *H. J. Matthews.*

Easily distinguished from *D. Forsteri* by the stouter habit and broader leaves, large spikelets, and by the more glabrous flowering glume, the lateral nerves of which are excurrent as short awns. It is a common Australian and Tasmanian plant.

4. **D. setifolia** *Hook. f. Fl. Nov. Zel.* i (1853) 299, t. 65B.—Culms tufted, slender, wiry, smooth, 4–12 in. high. Leaves shorter than the culms, narrow, setaceous or filiform; sheaths smooth, striate, the uppermost long, tight; ligules oblong, membranous. Panicle erect, 1–2½ in. long, ⅛–⅓ in. broad, narrow, contracted; branches few, short, erect, scaberulous, sparingly divided. Spikelets few, pale-green, ⅛ in. long; pedicels short, scabrid. Two outer glumes subequal, oblong-lanceolate, acuminate, firm, spreading, keeled, 1–3-nerved, the lateral nerves usually short, keel scabrid; 3rd or flowering glume ⅛–¼ shorter, hard and almost coriaceous, silky at the base, the hairs almost as long as the glume, truncate and minutely 4-toothed at the tip; awn from the middle of the back, stout, scabrid, recurved, longer than the spikelet. Palea almost as long as the flowering glume, linear-oblong, 2-nerved. Rhachilla produced into a silky bristle ½ as long as the palea or more.—*Buch. N.Z. Grasses* (1880) 6; *Cheesem. Man. N.Z. Fl.* (1906) 870. Agrostis setifolia *Hook. f. Handb. N.Z. Fl.* (1864) 329; *Buch. N.Z. Grasses* (1879) t. 24B. Calamagrostis setifolia *Cockayne in Bot. Stewart Is.* (1909) 49.

North and South Islands, Stewart Island, Auckland Islands: Not uncommon in mountain districts from the East Cape and Mount Egmont southwards. 3000–5000 ft.

Allied to the preceding species, but a much smaller plant, panicle smaller and more slender, spikelets not much more than half the size, and flowering glume much more silky at the base and broadly truncate at the tip.

5. **D. avenoides** *Buch. N.Z. Grasses* (1880) 6.—Culms tufted, erect, slender, rigid, smooth, 9–24 in. high. Leaves much shorter than the culms, narrow, in slender forms almost filiform, smooth, strongly involute; sheaths smooth, deeply grooved, the uppermost long; ligules short, broad. Panicle erect, 2–5 in. long, ¼–½ in. broad, narrow, contracted, usually dense; branches short, erect, sparingly divided. Spikelets pale-green, ⅛–¼ in. long; pedicels shorter than the spikelets. Two outer glumes subequal, lanceolate, acuminate, sharply keeled, rigid, 1- or rarely 3-nerved, keel scabrid, sides smooth or minutely rough; 3rd or flowering glume slightly shorter, hard, convolute, scabrid, slightly silky at the base, minutely 2–4-cuspidate; awn from below the middle, stout, recurved, twisted below the bend, longer than the spikelet. Palea almost as long as the flowering glume, linear, hyaline, 2-nerved. Rhachilla produced into a silky bristle nearly ½ as long as the palea.—*Cheesem. Man. N.Z. Fl.* (1906) 871. Agrostis avenoides *Hook. f. Handb. N.Z. Fl.* (1864) 330; *Buch. N.Z. Grasses* (1879) t. 24A. Calamagrostis avenoides *Cockayne in Bot. Stewart Is.* (1909) 49.

Var. **brachyantha** *Hack. MS.* — Culms taller and more slender, 1–3 ft. high. Leaves narrower, filiform, often strict and wiry. Spikelets smaller, about ⅛ in. long; rhachilla shorter and more delicate.

Zotov. Trans 73 : 234. merges Dichelachne in Deyeuxia

North and South Islands, Stewart Island : Var. *brachyantha* common throughout, ranging from sea-level to 3500 ft., the typical state apparently confined to mountain districts in the South Island, through which it appears to be generally distributed. Nelson—Wairau Gorge, *T. F. C.* Canterbury—Craigieburn Mountains, *Petrie!* Rangitata Valley, *Sinclair* and *Haast;* Tasman Valley, *T. F. C.* Otago—Not uncommon in upland districts, *Hector* and *Buchanan! Petrie! Cockayne!*

The typical state is well characterized by its large spikelets, which no doubt induced Hooker to give it the name of *avenoides;* but the var. *brachyantha* is an exceedingly puzzling form. Professor Hackel has no hesitation in placing it under *D. avenoides*, but most New Zealand botanists, including myself, have been accustomed to regard it as a state of *D. quadriseta*, to which it seems to show a very near approach, principally differing in the rather larger spikelets, with the rhachilla always produced at the back of the palea. It appears to me to be very much a matter of taste whether it should be placed under *D. avenoides* or *D. quadriseta*.

6. **D. Youngii** *Buch. N.Z. Grasses* (1880) 6, t. 25.—A tall perennial species. Culms erect, terete, glabrous, 1–4 ft. high, 3-noded, the uppermost node near the middle of the culm. Leaves much shorter than the culms, $\frac{1}{8}$–$\frac{1}{4}$ in. broad, flat, smooth and glabrous or scaberulous on the upper surface, rather flaccid; sheaths long, close, terete, minutely scaberulous; ligules oblong, obtuse. Panicle 3–6 in. long, narrow, sometimes dense and cylindric, but frequently open below; rhachis smooth; branches short, erect, binate or ternate, sparingly divided; pedicels shorter than the spikelets, smooth. Spikelets $\frac{1}{4}$ in. long, pale-green. Two outer glumes subequal, narrow-lanceolate, acute, rigidly membranous, 1-nerved, scabrid on the keel; 3rd or flowering glume about $\frac{1}{6}$ shorter, lanceolate, acute, denticulate at the tip, scabro-punctate on the back, callus with silky hairs $\frac{1}{3}$ as long as the glume; awn short, almost terminal. Palea nearly as long as the glume. Rhachilla produced into a hairy bristle behind the palea, about $\frac{1}{3}$ its length.—*Cheesem. Man. N.Z. Fl.* (1906) 871. Agrostis Youngii *Hook. f. Handb. N.Z. Fl.* (1864) 330; *Buch. N.Z. Grasses* (1879) t. 25.

Var. **Petriei** *Petrie in Trans. N.Z. Inst.* xlvii (1915) 57.—Awn arising from the middle of the back of the flowering glume, not terminal. Other characters as in the type.—D. Petriei *Cheesem. Man. N.Z. Fl.* (1906) 872. Calamagrostis Petriei *Hack. in Trans. N.Z. Inst.* xxxv (1903) 380.

South Island : Canterbury—Dry hillsides at the sources of the Waitaki River, *Haast;* Hooker Valley, Mount Cook district, *Petrie!* Mount Peel, *H. H. Allan!* Var. *Petriei:* Slopes of Mount Herbert, *A. Wall!* Otago—Swampy Hill, near Dunedin, *Petrie! A. Wall!* Mount Pisa, *Petrie.* 1500–3500 ft.

(Lab: II.)

7. **D. quadriseta** *Benth. Fl. Austral.* vii (1878) 581.—Culms tufted, erect, stout or slender, smooth or rather rough, 1–3 ft. high. Leaves much shorter than the culms, variable in width, sometimes $\frac{1}{8}$ in. broad and quite flat, at other times very narrow and setaceous or filiform, often involute, glabrous or minutely scaberulous; sheaths smooth or rough, grooved; ligules oblong, membranous. Panicle $1\frac{1}{2}$–6 in. long, very narrow and spike-like, dense, cylindric, rarely broader and obscurely lobed, pale-green or brownish-green, shining; branches numerous, short, erect, branched from the base. Spikelets small, about $\frac{1}{8}$ in. long, shortly pedicelled. Two outer glumes subequal, lanceolate, acuminate, keeled, keel minutely scabrid, slightly hairy at the base, tip minutely but distinctly 4-awned; dorsal awn attached below the middle, sometimes almost basal, usually not much longer than the outer glumes. Palea almost as long as the flowering glume, narrow, 2-nerved. Rhachilla either not at all produced at the back of the palea or very obscurely so.—*Cheesem. Man. N.Z. Fl.* (1906) 872. Agrostis

2. Deyeuxia conspicua (Forst) Zotov
Arundo conspicua Forst f. 1786 p. 7c.
D. sciurea (KBA.) Hk. f.

quadriseta *R. Br. Prodr.* (1810) 171; *Hook. f. Fl. Nov. Zel.* i (1853) 296; *Handb. N.Z. Fl.* (1864) 330; *Buch. N.Z. Grasses* (1879) t. 26. Avena quadriseta *Labill. Pl. Nov. Holl.* i (1806) 25, t. 32.

North and South Islands, Stewart Island: Not uncommon throughout. Sea-level to 2500 ft.

Also abundant in Australia and Tasmania. The rhachilla is seldom produced at the back of the palea, so that the plant technically falls into *Agrostis*. But it is so closely allied to *D. avenoides*, which is an undoubted *Deyeuxia*, that I have decided to leave it in that genus.

19. **DICHELACHNE** Endl.

Tall slender grasses. Leaves narrow, flat or convolute. Spikelets 1-flowered, numerous, arranged in long and narrow usually dense panicles; rhachilla disarticulating above the 2 outer glumes, very slightly or not at all produced beyond the flower. Glumes 3; 2 outer subequal or slightly unequal, empty, persistent, narrow, sharply acuminate, keeled, membranous; 3rd or flowering glume almost as long, keeled, entire or shortly 2-fid, furnished with a long flexuous awn inserted on the back just below the tip, base of the glume with a hairy callus. Palea slightly shorter than the glume, narrow, 2-nerved. Stamens 2–3. Styles short, distinct; stigmas plumose. Grain narrow, enclosed in the slightly hardened flowering glume and palea.

The genus is confined to the two following species, both of which extend to Australia and Tasmania.

Panicle dense. Spikelets $\frac{1}{3}$ in. Awn 1 in., not twisted at the base .. 1. *D. crinita.*

Panicle lax. Spikelets $\frac{1}{4}$ in. Awn $\frac{1}{2}$–$\frac{3}{4}$ in., usually twisted at the base 2. *D. sciurea.*

1. **D. crinita** *Hook. f. Fl. Nov. Zel.* i (1853) 293. — Annual. Culms tufted, tall, slender, erect, 2–3 ft. high, leafy at the base. Leaves much shorter than the culms, flat or convolute, glabrous or the lower ones sometimes softly pubescent; margins smooth or slightly scaberulous; sheaths grooved, the upper rather long; ligules short, broad. Panicle very dense and spike-like, 3–6 in. long or more, bristling with the numerous awns which almost conceal the spikelets, pale-green, shining; branches numerous, short, erect. Spikelets $\frac{1}{4}$–$\frac{1}{3}$ in. long. Two outer glumes more or less unequal, very narrow, long-acuminate, membranous or hyaline, keel green and scabrous; 3rd or flowering glume distinctly shorter, convolute, smooth or slightly rough, produced into a hyaline entire or 2-fid tip; awn very long, about 1 in., straight or flexuous, not twisted at the base. Palea about $\frac{1}{4}$ shorter than the flowering glume, linear, 2-nerved. — *Hook. f. Handb. N.Z. Fl.* (1864) 326; *Fl. Tasm.* ii (1860) 111; *Benth. Fl. Austral.* vii (1878) 574; *Buch. N.Z. Grasses* (1879) t. 16; *Cheesem. Man. N.Z. Fl.* (1906) 873. D. Hookeriana *and* D. Forsteriana *Trin. and Rupr. in Mèm. Acad. Petersb. Sèr.* vi, 5 (1842) 3, 4. Agrostis crinita *R. Br. Prodr.* (1810) 170; *A. Rich. Fl. Nouv. Zel.* (1832) 136; *A. Cunn. Precur.* (1836) n. 246; *Raoul Choix* (1846) 39. Anthoxanthum crinitum *Forst. f. Prodr.* (1786) n. 18.

Var. **intermedia** *Hack. MSS.*—Rather more slender; panicle narrower and laxer. A passage form into *D. sciurea.*

North and South Islands, Stewart Island, Chatham Islands: Plentiful in dry open situations throughout. Sea-level to 3000 ft. Also abundant in Australia and Tasmania.

+ D. micrantha (Cav.) Druce 1916 p. 619. But this change had been made by Domin (1915) see also N. Aust. & Skotb. Phanerogams of Easter Is. : 67.

(L.64)

2. **D. sciurea** *Hook. f. Fl. Nov. Zel.* i (1853) 294. — Smaller than *D. crinita* and more slender. Culms tufted, 1–2 ft. high, slender, quite glabrous. Leaves chiefly at the base of the culms and much shorter than them, narrow, flat or convolute, sometimes almost setaceous, glabrous or the lower ones pubescent; sheaths smooth; ligules short, broad. Panicle 3–6 in. long, much more lax and open than in *D. crinita;* branches slender, capillary, scabrid. Spikelets $\frac{1}{4}$ in. long, rarely more. Two outer glumes equal or nearly so, long-acuminate, margins hyaline, keel smooth or scabrid; 3rd or flowering glume nearly as long, convolute, smooth or slightly scabrous, entire or 2-fid at the tip; awn $\frac{1}{2}$–$\frac{3}{4}$ in. long, flexuous, usually but not invariably twisted at the base, inserted on the back of the glume close to the tip. Palea narrow-linear, 2-fid.—*Hook. f. Handb. N.Z. Fl.* (1864) 326; *Fl. Tasm.* ii (1860) 111, t. 158A; *Benth. Fl. Austral.* vii (1878) 574; *Buch. N.Z. Grasses* (1879) t. 16 (*in part*); *Cheesem. Man. N.Z. Fl.* (1906) 874. D. Sieberiana *Trin. and Rupr. in Mèm. Acad. Petersb. Sèr.* vi, 5 (1842) 2. D. montana *Endl. Prodr. Fl. Ins. Norf.* (1833) 24. Agrostis sciurea *R. Br. Prodr.* (1810) 171. Stipa micrantha *Cav. Ic.* v (1791–1801) 42; *F. Muell. in Journ. Bot.* (1878) 327 (*not of Benth. Fl. Austral.* vii (1878) 566).

Avenella sciurea Forst. f. 1926–9.

Var. **inaequiglumis** *Hack. MSS.*—Panicle with longer flaccid branches; spikelets more laxly arranged. Two outer glumes unequal, acute but not cuspidate, keel sharply scabrid; awn of flowering glume almost apical, not twisted at the base.

North Island: From the North Cape to Wellington; not so plentiful as *D. crinita.* South Island: Vicinity of Westport, *W. Townson!* Has also been recorded from Marlborough (*Buchanan*), Canterbury (*Armstrong*), and Greymouth (*T. Kirk*), but I have seen no specimens. see Trans 57: 69

Also in Australia, Tasmania, and Norfolk Island.

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20. **DESCHAMPSIA** Beauv. 1812.

Perennial grasses. Leaves narrow, flat or convolute. Spikelets rather small, 2-flowered, arranged in lax or contracted panicles; rhachilla disarticulating above the 2 outer glumes, produced between the flowering glumes and above the upper flower as a naked or hairy bristle, rarely ending in an imperfect flower. Glumes 4; 2 outer slightly unequal, persistent, empty, keeled, acute, membranous, shining; 3rd and 4th (or flowering glumes) membranous or almost hyaline, toothed at the apex; dorsal awn slender, twisted at the base, sometimes very small or wanting. Palea narrow, 2-nerved. Lodicules 2, ovate. Stamens 3. Styles distinct; stigmas plumose. Grain oblong, enclosed within the unaltered flowering glume and palea.

Species about 25, dispersed through most cold or temperate regions. One of the New Zealand species extends through the whole range of the genus; the remaining 6 are endemic. These constitute a somewhat anomalous group, differing from the true *Deschampsiae* in the awn being almost terminal and very small, or altogether absent. They may ultimately form a separate genus.

* Awn from the middle of the back of the flowering glume or below it.

Tall, 1–4 ft. high. Panicle long, 4–12 in. Spikelets $\frac{1}{5}$–$\frac{1}{4}$ in. .. 1. *D. caespitosa.*

** Awn from immediately below the tip of the flowering glume or wanting.

† *Rhachilla glabrous.*

Forming dense patches $\frac{1}{2}$–$1\frac{1}{2}$ in. high. Leaves short, curved. Panicle $\frac{1}{4}$–$\frac{3}{4}$ in., dense. Spikelets straw-yellow, shining. Awn wanting or rarely present .. .. .. 2. *D. pusilla.*

Slender, 3–9 in. Leaves shorter than the culms, involute. Panicle slender, lax, 1–3 in. long. Spikelets pale-green, apex of flowering glume irregularly denticulate. Awn wanting .. 3. *D. novae-zealandiae.*

D. Kingii (Hook.f.) Desv. in Gay. Flora Chilena. 5 VI (1853) 335.

Slender, 6–18 in. Leaves flaccid, flat or involute, often capillary. Panicle very slender, 3–6 in. Spikelets $\frac{1}{10}$–$\frac{1}{8}$ in., pale-green; apex of flowering glume 3-toothed. Awn usually present .. .. 4. *D. Chapmani.*

†† *Rhachilla hairy.*

Very slender, flaccid, 6–14 in. Leaves capillary. Panicle very slender, lax, 2–6 in. Spikelets small, $\frac{1}{10}$ in.; apex of flowering glume 3-toothed. Awn usually present .. .. 5. *D. tenella.*

Slender, tufted, 2–8 in. Leaves short, strict. Panicle lax, deltoid, $\frac{3}{4}$–2 in. Spikelets few, $\frac{1}{8}$–$\frac{1}{6}$ in.; apex of flowering glume 3-toothed. Awn usually present. Hairs of rhachilla long, copious .. .. 6. *D. gracillima.*

Slender, 3–6 in. Leaves short, flat. Panicle sparingly branched, lax, 1–2 in.; spikelets few. Flowering glume irregularly denticulate; awn wanting. Rhachilla with a minute empty glume at the apex .. .. .. 7. *D. penicillata.*

1. **D. caespitosa** *Beauv. Agrost.* 91 (1812) t. 18, f. 3.—Culms densely tufted, forming large tussocks, smooth, shining, rather stout or slender, leafy, 1–4 ft. high. Leaves rather stiff, narrow, flat or convolute, rough on the upper surface and margins; sheaths shining, smooth or rough; ligules long, membranous, acute. Panicles 4–12 in. long, usually rather narrow and dense in New Zealand examples, inclined or nodding above; branches in somewhat distant fascicles, capillary, smooth or minutely scaberulous. Spikelets $\frac{1}{5}$–$\frac{1}{4}$ in. long, shining, pale yellow-green or purplish. 5-6 mm. Two outer glumes keeled, acute or subacute, 1-nerved or the upper 3-nerved; 3rd and 4th or flowering glumes equalling the empty glumes or rarely exceeding them, truncate, 4-toothed, silky at the base, the 4th separated from the 3rd by a distinct hairy internode, sometimes absent so that the spikelet becomes 1-flowered; awn from the middle of the back or below it, not twisted at the base or obscurely so, usually not far exceeding its glume. Rhachilla produced into a distinct hairy pedicel above the 4th glume.—*Hook. f. Fl. Nov. Zel.* i (1853) 301; *Fl. Tasm.* ii (1860) 118; *Handb. N.Z. Fl.* (1864) 334; *Benth. Fl. Austral.* vii (1878) 587; *Buch. N.Z. Grasses* (1879) t. 37; *Cheesem. Man. N.Z. Fl.* (1906) 875. Aira caespitosa *Linn. Sp. Plant.* (1753) 64. A. Kingii *Hook. f. Fl. Antarct.* ii (1847) 376, t. 135. A. australis *Raoul Choix* (1846) 12. Agrostis aucklandica *Hook. f. Fl. Antarct.* i (1844) 96.

North and South Islands, Stewart Island, Chatham Islands, Auckland Islands: Wet places from the Lower Waikato southwards, plentiful. Sea-level to 3500 ft. Lake Rotoma Kirk Trans 5: 328

An abundant grass in all cool and temperate regions. The New Zealand form has the spikelets rather larger and the awn of the flowering glume inserted somewhat higher up than is usual in northern specimens, and is distinguished as var. *macrantha* by Hackel.

2. **D. pusilla** *Petrie in Trans. N.Z. Inst.* xxiii (1891) 403.—Culms densely tufted, branched at the base, 1–2 in. high, forming small compact patches. Leaves numerous, shorter than the culms, setaceous, curved, convolute; sheaths broad, membranous, grooved; ligules large for the size of the plant, acute, much broader than the blade, decurrent along the margins of the sheath. Panicle small, contracted, sometimes almost spiciform, straw-yellow, shining, $\frac{1}{4}$–$\frac{3}{4}$ in. long; branches few, short, small, the lowermost bearing 2–3 spikelets, the upper 1 only. Spikelets $\frac{1}{8}$ in. long, 2-flowered, rarely 3-flowered. Two outer glumes almost equal in length, hyaline, the lower narrower, 1-nerved, the 2nd 3-nerved; 3rd and 4th

or flowering glumes faintly silky or almost glabrous at the base, broadly oblong, hyaline, indistinctly 5-nerved, truncate, irregularly 3-toothed or erose, awnless or with a minute dorsal awn inserted just below the tip. Palea as long as the glume, deeply bifid, 2-nerved. Rhachilla elongated between the flowering glumes and produced beyond the upper flower into a short bristle, quite glabrous.—*Cheesem. Man. N.Z. Fl.* (1906) 876.

South Island: Otago — Hector Mountains, *Petrie!* Humboldt Mountains, *Cockayne!* 5000–6500 ft.

A very remarkable little plant, quite distinct from any of the following species.

3. **D. novae-zealandiae** *Petrie in Trans. N.Z. Inst.* xxiii (1891) 402.—Culms densely tufted, branched at the base, slender, smooth, leafy below, 3–9 in. high, rarely more. Leaves from $\frac{1}{3}$ to $\frac{1}{2}$ the length of the culms, very narrow, setaceous, involute; sheaths broad, pale, membranous, grooved; ligules long, scarious, acute, broader than the blade at the base. Panicle slender, erect, 1–3 in. long, usually lax but sometimes contracted; branches few, capillary, smooth or minutely scaberulous, sparingly divided. Spikelets few, small, $\frac{1}{10}$–$\frac{1}{8}$ in. long, pale-green, shining, 2-flowered. Two outer glumes unequal, the lower about $\frac{1}{2}$ the length of the spikelet, oblong-lanceolate, acute, 1-nerved, the upper about $\frac{2}{3}$ the length of the spikelet, broader and more obtuse, 3-nerved; 3rd and 4th or flowering glumes broadly oblong, hyaline, membranous, faintly 3–5-nerved, quite glabrous at the base, broadly truncate at the apex and irregularly minutely denticulate, awn wanting. Palea bifid, 2-nerved, nerves faintly ciliate. Rhachilla elongated between the flowering glumes and produced beyond the upper flower into a slender bristle, quite glabrous.—*Cheesem. Man. N.Z. Fl.* (1906) 876. D. Hookeri *T. Kirk in Journ. Bot.* xxiv (1891) 237 (*in part*).

South Island: Canterbury—Lake Lyndon, *Petrie!* Castle Hill, *T. Kirk!* Poulter River, *Cockayne.* Westland—Kelly's Hill, *Petrie! Cockayne!* Otago—Naseby, Pembroke, Mount St. Bathan's, Hector Mountains, Lake Te Anau, *Petrie!* 1000–5000 ft.

Although very closely allied to *D. Chapmani* and *D. tenella* this appears to be sufficiently distinct from both in the irregularly denticulate apex of the flowering glume and the total absence of the dorsal awn. Mr. Kirk united all three under the name of *D. Hookeri!*

4. **D. Chapmani** *Petrie in Trans. N.Z. Inst.* xxiii (1891) 401.—Culms tufted, branched at the base, quite smooth, leafy, 6–18 in. high. Leaves longer or shorter than the culms, very narrow, flat or involute, often almost filiform, flaccid; sheaths long, narrow, deeply grooved; ligules elongated, acute, broader than the blade at the base. Panicle very slender, 3–6 in. long or more, effuse or contracted, laxly and sparingly branched; branches capillary, minutely scaberulous, usually trichotomously divided. Spikelets few, small, about $\frac{1}{8}$ in. long, pale-green, glistening, 2-flowered. Two outer glumes unequal, much shorter than the spikelet, oblong-lanceolate, membranous, the lower short, 1-nerved, the upper $\frac{1}{2}$ longer, equalling the lower flower or slightly exceeding it, 3-nerved; 3rd and 4th or flowering glumes broadly oblong, membranous, faintly 3–5-nerved, glabrous at the base or rarely with few very short hairs, truncate at the apex and more or less irregularly 3–5-toothed; awn usually present on both glumes, from the back a little distance below the tip. Palea bifid, 2-nerved, nerves ciliate. Rhachilla elongated between the flowering glumes and produced beyond the upper flower into a slender bristle, quite glabrous.—*Cheesem. Man. N.Z. Fl.* (1906) 877. D. Hookeri *T. Kirk in Journ. Bot.* xxiv (1891) 237 (*in part*). Catabrosa antarctica *Hook. f. Fl. Antarct.* i (1844) 102, t. 56. Triodia antarctica *Benth. in Journ. Linn. Soc.* xix (1881) 111.

South Island: Canterbury—Arthur's Pass, *T. Kirk!* Otago—Clinton Saddle, *Petrie!* Milford Sound, *T. Kirk!* Stewart Island: Mount Anglem, *Cockayne.* Auckland and Campbell Islands, Antipodes Island, Macquarie Island: *Hooker, T. Kirk! F. R. Chapman! H. Hamilton!* Sea-level to 3500 ft.

Very close to the following species, of which it may prove to be a variety, and from which it is mainly separated by the glabrous rhachilla and rather larger spikelets.

5. **D. tenella** *Petrie in Trans. N.Z. Inst.* xxiii (1891) 402.—Culms tufted, branched at the base, extremely slender, flaccid, quite smooth, leafy throughout, 6–14 in. high. Leaves bright-green, very narrow, capillary, involute, flaccid, the uppermost often exceeding the young panicle; sheaths smooth, grooved; ligules long, acute, membranous, broader than the blade and decurrent along the margins of the sheaths. Panicle very slender, 2–6 in. long, contracted at first, but becoming lax and somewhat effuse; branches in pairs, few, rather distant, capillary, scabrid, trichotomously divided. Spikelets few towards the tips of the branches, small, $\frac{1}{10}$ in. long, pale, glistening, 2-flowered. Two outer glumes unequal, much shorter than the spikelet, membranous, 1-nerved or the upper 3-nerved; 3rd and 4th or flowering glumes broadly oblong, delicately hyaline, faintly 5-nerved, silky at the base, truncate at the apex and 3-toothed, the middle tooth often bifid, the 4th always with a minute dorsal awn inserted just below the apex, the 3rd frequently awnless. Palea bifid, 2-nerved, the nerve finely ciliate. Rhachilla elongated between the flowering glumes and more or less silky, produced above the upper flower into a silky bristle.—*Cheesem. Man. N.Z. Fl.* (1906) 878; *Ill. N.Z. Fl.* ii (1914) t. 224. D. Hookeri *T. Kirk in Journ. Bot.* xxiv (1891) 237 (*in part*). Catabrosa antarctica *Hook. f. Fl. Nov. Zel.* i (1853) 308 (*but not of Fl. Antarct.* i, 102); *Buch. N.Z. Grasses* (1879) t. 41B.

North Island: Ruahine Mountains, *Colenso!* Tararua Mountains, *H. H. Travers! Petrie!* South Island: Nelson—Mount Arthur, *A. McKay!* Otago—Near Dunedin, Catlin's River, Clinton Saddle, *Petrie!* Sea-level to 4500 ft.

This differs from both *D. novae-zealandiae* and *D. Chapmani* in the silky rhachilla, and from the former in addition in the dorsal awn being present in at least the upper flower. It varies greatly in the size of the spikelets and in the proportionate length of the outer glumes. Mr. Petrie's original specimens from Catlin's River have the spikelets barely more than $\frac{1}{12}$ in. long, and the upper outer glume is not half the length of the spikelet; but those from the Clinton Valley, and Mr. Colenso's from the Ruahine Range, have much larger spikelets with longer outer glumes.

6. **D. gracillima** *T. Kirk in Journ. Bot.* xxiv (1891) 237.—Culms tufted, usually with intravaginal branches near the base, erect, slender, glabrous, 2–8 in. high. Leaves towards the base of the culms and much shorter than them, strict, erect, very narrow, setaceous or filiform, convolute; sheaths rather lax, grooved; ligules long, membranous, usually split at the tip. Panicle erect, ovate or deltoid, open, $\frac{3}{4}$–2 in. long; branches few, binate, capillary, smooth or almost so. Spikelets $\frac{1}{8}$–$\frac{1}{6}$ in. long, on pedicels longer than themselves, 2-flowered. Two outer glumes unequal, 3-nerved, shorter than the spikelet; 3rd and 4th or flowering glumes densely silky at the base, oblong, membranous, 5-nerved, truncate at the tip and 3-toothed, the middle tooth entire or bifid or irregularly erose, the 3rd awnless or very obscurely awned, the 4th usually with a minute dorsal awn inserted just below the tip. Palea linear-oblong, bifid, 2-nerved, nerves finely ciliate. Rhachilla elongated between the flowering glumes and densely silky, produced above the upper flower into a long silky bristle.—*Cheesem. Man. N.Z. Fl.* (1906) 878.

Auckland Islands: Carnley Harbour, altitude 1000 ft., *T. Kirk! B. C. Aston!*

The densely tufted habit, short strict erect leaves, deltoid few-flowered panicle, large spikelets, and densely hairy rhachilla distinguish this from all its allies.

7. **D. penicillata** *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 354.—Culms tufted, slender, glabrous, leafy, 3–6 in. high. Leaves shorter than the culms, radical and cauline; blades short, $\frac{3}{4}$–$1\frac{1}{2}$ in. long, narrow, flat or involute, striate; sheaths pale, membranous, deeply grooved, the uppermost long, enclosing the culm up to the base of the panicle; ligules long, pointed, scarious, broader than the blade at the base. Panicle small, 1–2 in. long, few-flowered; branches few, capillary, the lower ones bearing 2–3 spikelets, the upper 1-spiculate. Spikelets $\frac{1}{8}$–$\frac{1}{6}$ in. long, pale yellow-green, shining, 2-flowered. Two outer glumes almost equalling the flowering glumes, subequal, oblong-lanceolate, subacute, hyaline, 3-nerved; 3rd and 4th or flowering glumes oblong, very delicate, with white hyaline tips, 5-nerved, silky at the base, obtuse or almost truncate at the tip and irregularly minutely denticulate, awn wanting. Palea linear-oblong, 2-nerved, nerves silky. Rhachilla elongated between the flowering glumes and produced beyond the upper flower into a bristle bearing a minute empty glume at its summit, silky throughout.—*Cheesem. Man. N.Z. Fl.* (1906) 879; *Vascl. Fl. Macquarie Is.* (1919) 34.

Macquarie Island: In swamps, *A. Hamilton!*

I regret that I have only seen two small and immature specimens of this curious little plant, which is by no means closely related to any other New Zealand species.

21. **TRISETUM** Pers. 1805

Perennial or rarely annual grasses. Leaves flat. Spikelets rather small, usually 2-flowered, more rarely 3–6-flowered, arranged in a narrow dense or lax panicle; rhachilla disarticulating above the 2 outer glumes, more or less produced between the flowering glumes and beyond the upper flower into a short bristle. Two outer glumes persistent, empty, equal or unequal, acute, keeled, 1–3-nerved. Flowering glumes 2–3, rarely more, equalling or exceeding the empty glumes, membranous with broad hyaline margins, 2-toothed at the apex, the teeth often produced into bristles or short awns; dorsal awn from the back below the tip, slender, straight or bent, often twisted at the base. Palea strongly 2-nerved, 2-toothed. Stamens 3. Styles very short, distinct; stigmas plumose. Grain enclosed within the flowering glume and palea, free.

A genus of about 60 species, most plentiful in the North Temperate Zone, but also found on the high mountains of the tropics and in South America and Australasia. One of the New Zealand species is widely spread, the rest are endemic.

* Awn at least as long as the glume, inserted on the back a little distance below the tip.

Glabrous or sparsely pubescent, 6–24 in. Panicle 2–10 in., rather lax. Empty glumes lanceolate, unequal .. .. .. 1. *T. antarcticum.*
Pilose, 2–3 ft. Panicle 2–10 in., very slender. Empty glumes oblong or oblong-obovate, subequal .. .. .. 2. *T. Youngii.*
Puberulous or tomentose, 2–12 in. Panicle dense, cylindric, $\frac{1}{2}$–2 in. 3. *T. subspicatum.*

** Awn very short, from between the terminal teeth of the glume.

Puberulous, 6–12 in. Panicle dense, cylindric, 1–3 in. Teeth of flowering glumes short .. .. 4. *T. Cheesemanii.*

1. **T. antarcticum** (Forst.) *Trin. in Mém. Acad. Petersb. Sér.* vi, 1 (1831) 61.—Perennial, very variable in size and degree of robustness. Culms tufted, slender, smooth or sparsely pubescent, 6–24 in. high. Leaves usually shorter than the culms, narrow, $\frac{1}{15}$–$\frac{1}{6}$ in. broad, flat or involute, flaccid, smooth or the margins finely scaberulous; sheaths long, narrow, grooved;

ligules short, truncate, hyaline, ciliolate. Panicle very variable, erect or inclined, contracted or rather lax, usually narrow, rarely broad and effuse, 1–10 in. long; branches short, slender, suberect, simple or again divided. Spikelets compressed, pale-green or brownish-green, shining, 2–3-flowered, rarely 1-flowered or 4-flowered, $\frac{1}{5}$–$\frac{1}{4}$ in. long. Two outer glumes unequal, the lower from less than $\frac{1}{2}$ to $\frac{2}{3}$ the length of the upper, lanceolate, acute, scabrid on the keel; margins broad, hyaline. Flowering glumes exceeding the empty glumes, oblong-lanceolate, 2-cuspidate at the apex, scabrous-pubescent on the back, margins hyaline; awn from the back a little distance from the tip, sometimes $\frac{1}{4}$-way down, not twisted, recurved, twice as long as the glume. Palea almost as long as the flowering glume. Rhachilla clothed with copious long silky hairs between the flowering glumes, produced beyond the upper flower into a silky bristle.—*Hook. f. Fl. Nov. Zel.* i (1853) 301, t. 68B; *Handb. N.Z. Fl.* (1864) 335; *Buch. N.Z. Grasses* (1879) t. 39; *Cheesem. Man. N.Z. Fl.* (1906) 880. Aira antarctica *Forst. f. Prodr.* (1786) n. 41. Avena antarctica *Roem. and Schult. Syst.* ii (1817) 676; *A Rich. Fl. Nouv. Zel.* (1832) 139; *A. Cunn. Precur.* (1836) n. 257; *Raoul Choix* (1846) 39. Danthonia pallida *A. Cunn. Precur.* (1836) n. 256 (*not of R. Br.*).

Var. **lasiorhachis** *Hack. MSS.*—Culms, leaf-sheaths, rhachis, and branches of the panicle densely pubescent. Other characters as in the type.

Var. **tenelium** *Petrie in Trans. N.Z. Inst.* xliv (1912) 187.—Smaller and much more slender. Culms erect, greatly exceeding the involute setaceous leaves. Panicle short, dense, oblong; or longer, linear, and more open. Spikelets mostly 2-flowered.

North and South Islands, Stewart Island, Chatham Islands: Abundant throughout. Sea-level to 4500 ft. The larger forms, common in the lowlands and in moist mountain-valleys, are good pasture-grasses. Var. *tenellum.*—South Island: Nelson—Lake Rotoiti, *T. Kirk!* Canterbury—Shingly river-valleys in the Mount Cook district, *Petrie! T. F. C.;* Takitimo Mountains, Mount Ida, Mount Buster, *Petrie!* 1800–3500 ft.

2. **T. Youngii** *Hook. f. Handb. N.Z. Fl.* (1864) 335. — Culms tufted, slender, erect, pilose or glabrous, 1–3 ft. high. Leaves mostly at the base of the culms and much shorter than them, $\frac{1}{12}$–$\frac{1}{4}$ in. broad, flat, smooth, pilose with long soft hairs; sheaths grooved, glabrous or pilose; ligules short, truncate, lacerate, hyaline. Panicle slender, very narrow, 2–8 in. long; rhachis pilose; branches short, close, suberect, few-flowered, also pilose. Spikelets compressed, pale-green or yellow-brown, shining, 1–3-flowered, about $\frac{1}{5}$ in. long. Two outer glumes almost as long as the flowering glumes, subequal or the lower about $\frac{1}{4}$ shorter than the upper, oblong or oblong-obovate, suddenly acuminate, membranous, scabrid along the keel. Flowering glumes oblong-lanceolate, shortly 2-cuspidate, minutely rough on the back; awn from $\frac{1}{5}$ to $\frac{1}{4}$ way down the back, rather stout, recurved, nearly as long again as the glume. Palea almost equalling the flowering glume. Rhachilla nearly glabrous, produced between the flowering glumes and above the upper flower.—*Buch. N.Z. Grasses*, t. 40B; *Cheesem. Man. N.Z. Fl.* (1906) 881; *Ill. N.Z. Fl.* ii (1914) t. 225.

North Island: Mount Hikurangi, East Cape, *Adams* and *Petrie!* ravines at the western base of Ruapehu and Ngauruhoe, *T. F. C.;* Tararua Range, *Buchanan! B. C. Aston!* South Island: Not uncommon in subalpine localities, especially on the western side. 3000–5000 ft.

Best distinguished from *T. antarcticum* by the much broader oblong or oblong-obovate empty glumes; but it is usually a taller and more pilose plant, with a narrower panicle.

T. saxiticolum, Cheesem. & Trans 57:1926:60

spicatum (L.) Richter. 1890 p. 59.

3. **T. subspicatum** *Beauv. Agrost.* (1812) 88.—Culms densely tufted, stout or slender, pubescent or tomentose, in New Zealand specimens from 2 to 12 in. high, rarely more. Leaves numerous at the base of the culms and much shorter than them, firm, erect, rather strict, flat, more or less downy or almost glabrous, $\frac{1}{12}$–$\frac{1}{6}$ in. broad; sheaths rather lax, deeply grooved; ligules short, scarious, lacerate. Panicle short and dense, cylindric or almost ovoid, rarely slightly lobed or interrupted at the base, $\frac{1}{2}$–2 in. long; rhachis densely tomentose; branches short, erect. Spikelets compressed, whitish or yellowish-green, rarely purplish, shining, 2–3-flowered, $\frac{1}{6}$–$\frac{1}{4}$ in. long. Two outer glumes unequal, lanceolate, keeled, scabrid along the keel, the outer 1-nerved, the 2nd 3-nerved. Flowering glumes oblong-lanceolate, 2-cuspidate or shortly 2-awned at the tip, hairy at the base, keel scabrid above, sides minutely rough; awn from $\frac{1}{6}$ to $\frac{1}{4}$ way down the back, longer than the glume, straight or recurved. Palea about $\frac{1}{5}$ shorter than the flowering glume, 2-nerved, scabrid along the nerves.—*Hook. f. Fl. Antarct.* i (1853) 97; *Handb. N.Z. Fl.* (1864) 335; *Benth. Fl. Austral.* vii (1878) 588; *Buch. N.Z. Grasses* (1879) t. 40A; *Cheesem. Man. N.Z. Fl.* (1906) 881.

Aira spicata L. 1753. See Britton & Brown 1:217

South Island: Not uncommon in alpine and subalpine localities throughout. Auckland Islands: *T. Kirk! J. S. Tennant!* Campbell Island: *Sir J. D. Hooker! R. M. Laing, H. C. Field!* Usually from 3500 to 5500 ft., but descends almost to sea-level in the Auckland Islands.

A common alpine grass in most countries, extending into both Arctic and Antarctic regions.

Koeleria Petrie 48—192.

4. **T. Cheesemanii** *Hack. in Trans. N.Z. Inst.* xxxv (1903) 381.—Culms rather stout, erect, 3–12 in. high, naked and puberulous above, leafy below, 2-noded, the upper node in the lower $\frac{1}{4}$ of the culm. Leaves crowded at the base of the culms, flat, $\frac{1}{10}$–$\frac{1}{8}$ in. broad, firm, erect, glaucous, finely scaberulous on the veins and margins; sheaths rather lax, subcompressed, minutely puberulous; ligules short, truncate, denticulate. Panicle very dense, cylindrical, 1–2$\frac{1}{2}$ in. long, $\frac{1}{2}$ in. broad; rhachis tomentose; branches densely imbricate, short, binate or ternate. Spikelets elliptic-lanceolate, compressed, whitish-yellow, shining, 2-flowered, about $\frac{1}{4}$ in. long. Two outer glumes slightly unequal, lanceolate, acute, scabrid on the keel, minutely rough on the sides, the lower 1-nerved, the 2nd 3-nerved. Flowering glumes lanceolate, very shortly 2-cuspidate, slightly hairy at the base, minutely rough, faintly 5-nerved; awn very short indeed, from between the terminal teeth or just below them. Palea $\frac{1}{4}$ shorter than the glume, scabrid along the nerves. Rhachilla produced between the flowering glumes and beyond the upper flower, silky.

North Island: Mount Hikurangi, *Petrie!* South Island: Marlborough—Mount Blairich, *J. H. Macmahon!* Canterbury—Craigieburn Mountains, *Petrie! Cockayne!* Hooker Glacier, *T. F. C.* Otago—*Petrie!* 3000–5000 ft.

This has much of the habit and appearance of *T. subspicatum*, but differs from it, and from all the other species, in the very shortly bidentate flowering glume, with the intermediate awn springing almost from between the teeth, not from the back some distance below the teeth, as is usual in the genus. In consequence of this peculiarity Mr. Petrie has proposed to remove the species to the genus *Koeleria* (see Trans. N.Z. Inst. xlviii (1916) 192). It is possible that he may be right in his contention, but as Professor Hackel, who first described the species, and was also the first to recognize its near approach to *Koeleria*, nevertheless decided, after full examination, to retain it in *Trisetum*, I have thought it best to follow the same course. Technically speaking, *Trisetum* and *Koeleria* fall into two separate families, but nevertheless most botanists find a difficulty in apportioning the species. Domin, in monographing *Koeleria*, found

see "The grass genus Amphibromus" J.R. Swallen Ann. J. Bot. xviii: 1931: 411-415. 5 spp. mcoy. 2 aust. 1 N.Z. 2 S. America.

it necessary to expunge 13 species of *Trisetum* that had been, according to his views, erroneously placed in *Koeleria*. The excellent botanist Boissier, in his classic "Flora Orientalis," described the same species in one part of his work as a *Koeleria*, and in another as a *Trisetum!* Personally, I regard the position of *Trisetum Cheesemanii* as very much a matter of taste. Its resemblance to *Koeleria* is admitted; but its equally great resemblance to *Trisetum subspicatum* must also be taken into account.

22. **AMPHIBROMUS** Nees. 1843.

Slender glabrous grasses. Leaves flat. Spikelets 5–10-flowered, arranged in a lax panicle; rhachilla slender, hairy, jointed between the flowers. Two outer glumes persistent, empty, acute, keeled, 5-nerved at the base, with scarious margins, awnless. Flowering glumes more rigid, rounded on the back, prominently 5-nerved, often split at the tip with the lobes produced into short awns; dorsal awn from about the middle of the back, straight or bent, often twisted. Palea thin, 2-toothed. Stamens 3. Styles short, distinct; stigmas plumose. Lodicules 2. Grain oblong, glabrous, enclosed within the flowering glume and palea.

A small genus of 2 species, the present one and another endemic in Australia.

1. **A. fluitans** *T. Kirk in Trans. N.Z. Inst.* xvi (1884) 374, t. 28.—Culms weak, branched, creeping and rooting at the base, erect or floating above, glabrous, 12–18 in. long. Leaves numerous, sheathing the culm up to the base of the panicle, narrow, flat, minutely scabrid on the margins and veins; sheaths rather broad and lax, compressed, grooved, longer than the internodes; ligules long, pointed, hyaline. Panicle 2–4 in. long, narrow, lax, few-flowered; branches few, short, capillary, scaberulous, the lowermost with 2–3 spikelets, the upper 1-spiculate. Spikelets compressed, pale-green, usually about $\frac{1}{2}$ in. long without the awns, 4–7-flowered. Two outer glumes unequal, small, the upper not one-half the length of the flowering glume above it. Flowering glumes silky at the base, firm and rather rigid when in fruit, 5–7-nerved, scabrous on the back and sides; awn from the middle of the back, long, straight, scabrid, not bent nor twisted. Palea hyaline, 2-nerved, strongly ciliate on the nerves.—*Cheesem. Man. N.Z. Fl.* (1906) 882.

North Island: Auckland—Marshes near Waiuku, *H. Carse!* Lakes Whangape and Waikare, *T. F. C.*; Lake Waihi, *T. Kirk!* Taranaki—Swamps near New Plymouth, *T. F. C.* S. Island Lake Tekapo H.H.A. - see Allan Trans. 65 p. 281

Distinguished from the Australian *A. Neesii* by the weak decumbent habit, smaller panicle, narrower spikelets, shorter outer glumes, and straight awn.

23. **DANTHONIA** D.C. Lamol- 1805

Perennial or rarely annual grasses. Leaves very variable. Spikelets 3- to many-flowered, laterally compressed, arranged in a lax or dense panicle, rarely in a simple raceme; rhachilla disarticulating above the 2 outer glumes and between the flowering glumes, produced beyond the uppermost flower. Two outer glumes persistent, empty, equal or more or less unequal, keeled, acute or acuminate, 3–7-nerved, as long as the whole spikelet or slightly shorter. Flowering glumes 2 or more, rounded on the back, usually ciliate on the margins, 5–9-nerved, hairy, the hairs often collected into variously arranged tufts, 2-lobed at the tip, the lobes often produced into short awn-like bristles; awn from the sinus between the lobes, usually long and rigid and twisted, rarely reduced to

a mucro; callus at the base of the glume, hairy. Palea broad, hyaline, 2-keeled. Lodicules 2. Stamens 3. Styles distinct; stigmas plumose. Grain oblong, ellipsoid, or obovoid, free within the flowering glume and palea.

Species not far from 100, widely dispersed in both hemispheres, but chiefly in the South Temperate Zone, particularly abundant in Australia, New Zealand, and South Africa. Of the 13 species found in New Zealand, 2 extend to Australia, the rest are endemic.

* Two outer glumes shorter than the spikelet, very rarely almost equalling it.

† *Culms tall, stout. Panicle large; spikelets numerous.*

Culms 2–5 ft. Leaves $\frac{1}{4}$–$\frac{1}{3}$ in., often pilose. Panicle 6–18 in., lax. Awn straight, not flattened nor twisted at the base .. .. 1. *D. Cunninghamii.*
Culms $1\frac{1}{2}$–2 ft. Leaves terete, undulate, clothed with appressed hairs. Awn flattened at the base and twisted .. .. 2. *D. ovata.*
Culms 1–4 ft. Leaves involute. Panicle 4–6 in., ovate, dense. Awn seldom twisted .. .. 3. *D. bromoides.*
Culms 2–5 ft. Leaves involute. Panicle 4–18 in., lax. Awn flattened and twisted at the base .. .. 4. *D. Raoulii.*

†† *Culms shorter, 6–18 in. Panicle small, 1–3 in. long; spikelets few, 3–12.*

Culms 6–18 in. Leaves involute, compressed. Spikelets 8–12. Nerves of flowering glume connected by transverse veinlets .. 5. *D. crassiuscula.*
Culms 2–6 in. Leaves involute, flattened, erect, rigid, pungent-pointed, glaucous. Spikelets 3–8 .. .. 6. *D. pungens.*
Culms 6–18 in., much branched below. Leaves very narrow, involute, terete, wiry. Spikelets 3–8; awn twisted .. 7. *D. australis.*
Culms 6–12 in. Leaves flat or involute, not terete. Spikelets 4–8; awn not twisted .. .. 8. *D. oreophila.*
Culms 9–14 in. Leaves flat, thin. Spikelets 6–12; awn twisted 9. *D. planifolia.*

** Two outer glumes longer than the spikelets.

Culms 12–24 in., often pilose. Panicle 1–4 in., narrow. Flowering glume with two marginal tufts of hairs, but no transverse rings. Awn long .. .. 10. *D. pilosa.*
Culms 3–30 in., usually glabrous. Panicle 1–4 in., narrow, compact. Flowering glume with 2 dense transverse rings of silky hairs. Awn long .. .. 11. *D. semiannularis.*
Culms 3–12 in., glabrous. Panicle $\frac{3}{4}$–2 in. Flowering glume sparsely silky, transverse rings obscure. Awn hardly longer than the glume .. .. 12. *D. Buchanani.*
Culms 3–12 in. Panicle $\frac{3}{4}$–$1\frac{1}{4}$ in. Spikelets 2–3-flowered. Flowering glume very shortly bifid at the top. Awn short, straight. A tuft of hairs at the base of the glume, 2 minute tufts on each side, with a few hairs on the back .. .. .. 13. *D. nuda.*

1. **D. Cunninghamii** *Hook. f. Handb. N.Z. Fl.* (1864) 332.—Densely tufted, often forming large tussocks. Culms stout, 2–5 ft. high, $\frac{1}{4}$–$\frac{1}{2}$ in. diam. at the base, glabrous or more or less pilose. Leaves $1\frac{1}{2}$–4 ft. long, $\frac{1}{4}$–$\frac{1}{3}$ in. broad, rigid and coriaceous, flat or concave, strongly nerved, midrib prominent beneath, glabrous or pilose on the margins and upper surface in the lower half of the leaf, margins scaberulous; sheaths rather lax, often $\frac{1}{2}$ in. broad or even more, deeply grooved, usually silky-pilose in the grooves; ligules reduced to a transverse line of densely set short silky hairs. Panicle large, erect or inclined, effuse or compact, 6–18 in. long; branches few or many, solitary or binate or in alternate fascicles, 3–12 in. long; branchlets slender, capillary, scaberulous, few-flowered. Spikelets rather distant, pedicelled, $\frac{1}{3}$–$\frac{1}{2}$ in. long without the awns, 3–7-flowered. Two outer glumes unequal, lanceolate, acute or acuminate,

D. flavescens var. hookeri Zotov.
D. antarctica Hooker non (Thunb.) Spreng. 1825
Petrie Subcant. Is. 2: 475.
What is D. glaucida Kirk Trans. 17: 224? Nom. Nud?

membranous, 3-nerved, the upper one shorter than the flowering glume above it. Flowering glumes clothed with long silky hairs at the base and along the lower half of the margins, glabrous elsewhere, 7–9-nerved, deeply 2-fid at the tip with the points produced into short awns; awn from between the lobes, about $\frac{1}{3}$ in. long, straight or recurved, not flattened nor twisted at the base. Palea nearly as long as the glume, linear-oblong.—*Buch. N.Z. Grasses* (1879) t. 29; *Cheesem. Man. N.Z. Fl.* (1906) 884. D. antarctica *var.* laxiflora *Hook. f. Fl. Nov. Zel.* i (1853) 302. D. rigida *Hook. f. Fl. Nov. Zel.* i (1853) 303, t. 69A (*not of Raoul*). D. pentaflora *Col. in Trans. N.Z. Inst.* xvi (1884) 343. Agrostis pilosa *A. Cunn. Precur.* (1836) n. 254 (*not of A. Rich.*).

North and South Islands, Stewart Island: From the Bay of Islands southwards, but often local or absent from large districts. Sea-level to 3500 ft.

A handsome species, often attaining a large size. It is distinguished from all the forms of *D. Raoulii* by the flatter leaves, which are often softly pilose on the sheaths and margins, and by the rather smaller spikelets with a straight subulate awn, not flattened nor twisted at the base.

xxix · 2.

2. **D. ovata** *Buch. N.Z. Grasses* (1879) t. 29.—Densely tufted, forming compact yellowish-green tussocks. Culms 1½–2 ft. high, $\frac{1}{6}$ in. diam. at the base, slender, terete, glabrous or slightly pilose. Leaves shorter than the culms, few in number, slender, involute and terete, undulate above the middle and sometimes almost to the base, rigid, pale yellowish-green, narrowed upwards into long filiform undulate points; both surfaces clothed with long appressed hairs except the smooth rounded keel and the thickened margins, which are more or less glabrous, deeply and regularly grooved. Sheaths long, cylindric, closed almost to the top, glabrous or nearly so; ligule a broad rim of hairs at the mouth of the sheath. Panicle 2–4 in. long, sparingly branched, ovate, branches few, in whorls of 3, glabrous. Spikelets few, remote, rather large for the size of the plant, $\frac{1}{2}$–$\frac{2}{3}$ in. long without the awns, 4–6-flowered; pedicels long, glabrous or nearly so. Flowering glumes subequal, lanceolate, acute, 3–7-nerved, deeply 2-fid at the tip, silky at the base and sides; central awn flattened at the base and twisted. Palea nearly as long as the glume.—*Cheesem. Man. N.Z. Fl.* (1906) 885. D. teretifolia *Petrie in Trans. N.Z. Inst.* xlvi (1914) 36.

South Island: Southland—Mount Eglinton, *J. Morton;* End Peak and Mount Cleaughearn, *Crosby Smith!* The Hump, near Lake Hauroto, *J. Speden!* top of Longwood Range, *Petrie!* 2500–4500 ft.

A remarkably distinct species. It is no doubt identical with Buchanan's *D. ovata*, but it is so badly described and figured that his name barely deserves consideration.

3. **D. bromoides** *Hook. f. Fl. Nov. Zel.* i (1853) 303, t. 68A.—Densely tufted, forming tussocks 1–4 ft. high. Culms stout, often as thick as the little finger at the base, quite glabrous, leafy throughout. Leaves longer or shorter than the culms, involute, gradually narrowed into very slender almost filiform points, coriaceous, smooth, polished, deeply striate; margins smooth, often pilose with long hairs towards the base; sheaths long, pale, compressed, grooved, margins scarious; ligules reduced to a transverse band of short densely set silky hairs. Panicle short, ovate-lanceolate or ovate-oblong, contracted, densely many-flowered, 4–6 in. long; rhachis glabrous, angled; branches short, close, suberect, 1–3 in. long. Spikelets pedicelled, about $\frac{3}{4}$ in. long without the awns, rather broad, oblong or linear-oblong, 4–10-flowered, the upper flower usually imperfect. Two

4. D. rigida Raoul 1844 p. 116. Ann. Sci. Nat.

outer glumes about $\frac{2}{3}$ the length of the spikelet, unequal, lanceolate, obscurely 3–5-nerved. Flowering glumes clothed in their lower half with long silky hairs on the margins and back, 7–9-nerved, sharply 2-fid at the tip, the divisions often produced into short awns; intermediate awn from between the divisions, $\frac{1}{2}$–$\frac{3}{4}$ in. long, stout, erect or spreading, convex or slightly flattened at the base, rarely twisted. Palea linear-oblong, 2-nerved, ciliate on the nerves.—*Handb. N.Z. Fl.* (1864) 332; *Cheesem. Man. N.Z. Fl.* (1906) 885. Bromus antarcticus *Hook. f. Fl. Antarct.* i (1844) 97, t. 54. Danthonia antarctica *var.* elata *Hook. f. Fl. Nov. Zel.* i (1853) 302.

North Island: In various localities near the sea, rare and local. Auckland—Between Whangaroa and Mangonui, *T. F. C.*; Bay of Islands, *T. Kirk! T. F. C.*; Maunganui Bluff, *Petrie!* Wellington—Hills near Wellington, *Stephenson*; near Cape Palliser, *Buchanan!* Auckland and Campbell Islands: Abundant on the hills, *Hooker, Buchanan! T. Kirk!* See Subl. Is. 2. 475.

I am still doubtful whether the Auckland and Campbell Islands plant, originally described by Hooker as *Bromus antarcticus*, has been rightly merged by him with the North Island *D. bromoides*. It is much larger and stouter, with larger spikelets containing more numerous florets, and often forms tussocks 3–4 ft. high, attaining a size almost equal to that of *D. Raoulii*, whereas the typical *bromoides* is rarely more than 18 in. high. If further investigation should prove it to be distinct, there seems to be no reason why Hooker's name of *D. antarctica* (Fl. Nov. Zel. i, 302) should not be reapplied to it, for although he also included the plant now known as *D. Cunninghamii* it was as a separate variety, the Auckland Islands plant being evidently treated as the type of the species.

4. **D. Raoulii** *Steud. Syn. Pl. Glum.* (1855) 246.—Densely tufted, forming large brownish-green tussocks 2–5 ft. high. Culms stout or slender, smooth, often branched at the base. Leaves numerous, longer or shorter than the culms, variable in width at the base, gradually narrowed into long filiform points, strongly involute and rush-like when dry, coriaceous, smooth and polished on the back, ribbed on the inner face; margins smooth, glabrous or pilose just above the ligules; sheaths brownish, much broader than the blade, often lax and scarious towards the base, coriaceous above, glabrous or sparsely pubescent; ligules reduced to a transverse band of short dense hairs. Panicle variable in size, 4–18 in. long, lax; branches few or many, divided, slender, filiform, smooth and glabrous; pedicels long, often silky towards the tips. Spikelets $\frac{1}{2}$–$\frac{3}{4}$ in. long without the awns, 4–10-flowered. Two empty glumes unequal, from $\frac{1}{2}$–$\frac{2}{3}$ the length of the spikelet, ovate-lanceolate, the lower 3-nerved, the upper 5-nerved, the lateral nerves usually short. Flowering glumes with long silky hairs at the base and on the margins for $\frac{1}{2}$ their length or more, often also fringed on the lower part of the back, deeply bifid at the tip, the divisions usually produced into short scabrid awns, 7–9-nerved; central awn long, $\frac{1}{3}$–$\frac{1}{2}$ in., straight or recurved, flattened and usually twisted at the base. Palea rather shorter than the glume, 2-nerved, silky on the nerves.—*Buch. N.Z. Grasses* (1879) t. 30; *Cheesem. Man. N.Z. Fl.* (1906) 886; *Ill. N.Z. Fl.* ii (1914) t. 226. D. rigida *Raoul Choix* (1846) 12; *Hook. f. Fl. Nov. Zel.* i (1853) 303, t. 69A (*not of Steud.*).

Trans. 43: 368.

Var. **flavescens** *Hack. MSS.*—More robust; culms often $\frac{1}{2}$ in. diam. at the base. Leaves broader; sheaths sometimes $\frac{1}{2}$–$\frac{3}{4}$ in. across; lamina $\frac{1}{4}$–$\frac{1}{3}$ in. at the base. Spikelets rather larger.—D. flavescens *Hook. f. Handb. N.Z. Fl.* (1864) 332; *Buch. N.Z. Grasses* (1879) t. 32. Trans 43 : 368

Var. **Cheesemanii** *Hack. MSS.*—Culms slender. Leaves pale-green, complicate, compressed, not terete and rush-like when dry, strongly ribbed on both surfaces; margins and ribs on the back rough and scabrid. Panicle-branches scaberulous. Awn rarely twisted.

var. teretifolia petrie Trans. 54: 1923: 571

D. flav. var cheesemanii (Hack & Cheesem) Zotov

D. rigida var. teret. (Petrie) Zotov.

North and South Islands, Stewart Island: From Mount Hikurangi and Mount Egmont southwards, abundant in hilly and mountain districts. Sea-level to 5500 ft. "*Snow-grass.*" Var. *Cheesemanii:* Open forests near the source of the Takaka River, Nelson, altitude 3000 ft., *T. F. C.;* Endeavour Inlet, Queen Charlotte Sound, *J. H. Macmahon!*

A most abundant plant in the elevated hilly districts of the South Island, often forming the major portion of the vegetation over large areas. I agree with Professor Hackel in considering *D. flavescens* to be simply a broad-leaved state of *D. Raoulii;* in point of fact the two forms graduate into one another so insensibly that it is impossible to draw a strict line of demarcation between them.

Var. *Cheesemanii* is well distinguished by its scabrid leaves, which are compressed and plicate, and prominently nerved. It may prove to be a separate species.

5. **D. crassiuscula** *T. Kirk in Trans. N.Z. Inst.* xvii (1885) 224.—Culms tufted, forming lax tussocks, stout, strict, erect, leafy, 6–18 in. high. Leaves shorter or rarely longer than the culms, distichous, rigid and coriaceous, curved, gradually narrowed to the tips but not drawn out into filiform points, strongly involute, compressed, smooth and polished on the back, with numerous thick veins in front; margins smooth; sheaths stout, much broader than the blade, smooth, grooved; margins thinner and scarious; ligules reduced to an obscure band of short stiff hairs. Panicle short, lax, broadly ovate, 1½–3 in. long; branches few, spreading, 2–3-spiculate, and with the rhachis more or less silky-pubescent. Spikelets about ⅓ in. long without the awns, 4–7-flowered. Two outer glumes unequal, lanceolate, 3–5-nerved, the longer frequently ⅘ the length of the entire spikelet. Flowering glumes densely silky at the base, and with long silky hairs on the margins and back for about ½ their length, 7–9-nerved, the nerves connected by transverse veins at about the level of the awn, tip deeply bifid, the lobes pointed but not awned; central awn ¼–⅓ in. long, flat at the base and often twisted. Palea slightly shorter than the glume.—*Cheesem. Man. N.Z. Fl.* (1906) 887.

South Island: Probably abundant in high mountain districts throughout. Canterbury—Mountains above the Broken River, *T. F. C.;* Upper Waimakariri, *Cockayne!* Westland—Kelly's Hill, *Petrie!* Otago—Mount Arnould, Hector Mountains, *Petrie!* mountains above Lake Harris, Longwood Range, *T. Kirk!* Stewart Island: Mount Anglem, *T. Kirk!* 3500–6000 ft.

Closely allied to *D. Raoulii*, but a smaller and proportionately stouter plant, with shorter compressed leaves not drawn out into filiform points, much smaller panicles with silky-pubescent branches, smaller spikelets with longer outer glumes, and with the nerves of the flowering glumes connected by transverse veinlets.

6. **D. pungens** *Cheesem. Man. N.Z. Fl.* (1906) 887.—Culms densely tufted, branched at the base, forming irregular patches about 1 ft. across, smooth, slender, rigid, 2–6 in. high. Leaves mostly at the base of the culms and much shorter than them, distichous, 1½–3 in. long, about $\frac{1}{10}$ in. broad at the base, gradually tapering upwards into a pungent point, strict, erect, rigid and coriaceous, involute, almost equitant at the base, finely striate, glaucous; margins thickened, smooth; sheaths compressed, grooved; ligules reduced to a narrow band of short white hairs. Panicle small, lax, ovate, 1–1½ in. long, of 3–8 spikelets; branches few, slender, silky. Spikelets about ⅓ in. long without the awns, 3–5-flowered. Two outer glumes slightly unequal, almost as long as the spikelet, lanceolate, membranous, 3–5-nerved. Flowering glumes silky at the base, and equally clothed with silky hairs for ½ their length, 7–9-nerved, deeply 2-fid at the apex, the lobes lanceolate, acute but not awned; central awn flattened

and usually spirally twisted at the base. Palea almost as long as the flowering glume, ciliate on the nerves and silky on the margins near the base.

STEWART ISLAND: Very abundant above the scrub-line on all the mountains visited, *T. Kirk! Cockayne, F. G. Gibbs,* and others. Apparently restricted to the island.

A remarkably distinct and curious little plant, at once recognized by the flattened rigid and pungent pointed leaves.

7. **D. australis** *Buch. N.Z. Grasses* (1879) t. 31.—Forming extensive patches on alpine or subalpine slopes. Culms much branched at the base, prostrate or decumbent and covered with the remains of the old leaves, ascending and then erect above, quite glabrous, 6–18 in. high. Leaves numerous towards the base of the culms and much shorter than them, distichous, imbricate, strict, rigid, erect or curved to one side, 2–6 in. long, about $\frac{1}{40}$ in. broad, closely involute, smooth and polished, acute at the tip; sheaths short, closely overlapping, tight, much broader than the blade; ligules reduced to a line of silky hairs. Panicle small, lax, 1–2 in. long, of 3–8 spikelets on slender capillary silky-pubescent branches. Spikelets $\frac{1}{2}$–$\frac{2}{3}$ in. long, 4–7-flowered. Two outer glumes slightly unequal, lanceolate, acuminate, membranous, 5–7-nerved, from $\frac{4}{5}$ to $\frac{5}{6}$ the length of the spikelet. Flowering glumes silky at the base and with the back and margins fringed with silky hairs for more than $\frac{1}{2}$ their length, deeply 2-fid at the tip, the divisions produced into short scabrid awns, 7–9-nerved; central awn $\frac{1}{3}$–$\frac{1}{2}$ in. long, slender, flat and spirally twisted at the base. Palea shorter than the glume, linear-oblong.—*Cheesem. Man. N.Z. Fl.* (1906) 888; *Ill. N.Z. Fl.* ii (1914) t. 227. *D. Raoulii* var. australis *Buch. in Trans. N.Z. Inst.* iv (1872) 224.

SOUTH ISLAND: Not uncommon on the mountains of Nelson, Canterbury, and Westland, altitude 3500–6000 ft. "*Carpet-grass*"; "*Hassock-grass.*"

A well-marked species, often covering acres on the higher mountains of Nelson and North Canterbury, usually affecting steep slopes. After the melting of the snow in early summer, which usually leaves the culms and leaves pointing downhill, these slopes are most slippery and treacherous to cross. There is a specimen in Mr. Petrie's herbarium marked "Campbell Island, J. Buchanan."

8. **D. oreophila** *Petrie in Trans. N.Z. Inst.* xxvii (1895) 406.—Culms densely tufted, much branched at the base, slender, erect, leafy, 6–12 in. high. Leaves subdistichous, 2–5 in. long by $\frac{1}{12}$–$\frac{1}{10}$ in. broad at the base, tapering upwards into long slender points, flat or involute, grooved, margins scaberulous above; ligules reduced to a transverse band of short dense hairs with a few longer ones on each side. Panicle about $1\frac{1}{2}$ in. long, broadly ovate, lax, of 4–8 spikelets; branches few, capillary, glabrous or with a tuft of silky hairs at the forks. Spikelets $\frac{1}{4}$–$\frac{1}{3}$ in. long, 4–7-flowered. Two outer glumes slightly unequal, acute, membranous, 3–5-nerved, about $\frac{4}{5}$ the length of the spikelet. Flowering glumes densely silky at the base and on the margins for $\frac{1}{2}$ their length, a few silky hairs also along the lower part of the back, membranous, 9-nerved, deeply 2-fid at the tip, the lobes broad, acute but not awned; intermediate awn from between the lobes, about $\frac{1}{8}$ in. long, reflexed, flattened at the base but not twisted. Palea linear-oblong, 2-nerved, ciliate on the nerves.—*Cheesem. Man N.Z. Fl.* (1906) 888. D. pallida *Petrie in Trans. N.Z. Inst.* xxvi (1894) 271 (*not of R. Br.*).

D penicillata (Labill.) Palisot de Beauvois 1812 p. 192.
Arundo penicillata Labill. 1804.

Petrie, cumberl. Trans 73 234

(flavescens. Var. **elata** (*Petrie*) *in Trans. N.Z. Inst.* xlv (1913) 274—Much taller and stouter than the type, 18–20 in. high, forming dense tussocks. Panicles larger, reddish when young.

South Island: Canterbury—Candlestick Range, *Cockayne!* Westland—Kelly's Hill, *Petrie!* 3500–4500 ft. Var. *elata:* Sealey Range, Hooker Valley, 4000–5000 ft., *Petrie! T. F. C.*

Allied to *D. australis*, but much less rigid and not so densely tufted, with broader flatter leaves; the panicle-branches are nearly glabrous and the spikelets smaller and paler; the terminal lobes of the flowering glume are broader and not awned; and the central awn is shorter and not twisted at the base. It is still nearer to *D. planifolia.*

9. **D. planifolia** *Petrie in Trans. N.Z. Inst.* xxxiii (1901) 328.—Culms apparently not tufted, sparingly branched at the base, erect, slender, glabrous, 9–14 in. high. Leaves chiefly at the base of the culms and much shorter than them, 2–5 in. long, $\frac{1}{10}$–$\frac{1}{6}$ in. broad, gradually tapering to an acute point, flat, smooth, striate; sheaths rather lax, pale, grooved, the uppermost much longer than the blade; ligules a transverse band of long soft hairs. Panicle short, lax, ovate, 1½–2 in. long, of 6–12 spikelets; branches few, slender, silky with long hairs. Spikelets rather large, about ½ in. long, pale-green tinged with purple, 3–5-flowered. Two outer glumes subequal, lanceolate, acuminate, membranous, 3–5-nerved, about as long as the spikelet. Flowering glumes densely silky at the base, and with long silky hairs along the margins and back for ½ their length, deeply 2-fid at the apex, the lobes acute or acuminate, but scarcely awned, 7–9-nerved; intermediate awn from between the lobes, ⅓–½ in. long, more or less flattened and twisted at the base. Palea linear-oblong, deeply bifid, 2-nerved, nerves ciliate.—*Cheesem. Man. N.Z. Fl.* (1906) 889.

South Island: Otago—Clinton Saddle, to the west of Lake Te Anau, *Petrie!* 2500 ft.

This only differs from *D. oreophila* in the flatter and more membranous leaves, larger spikelets with longer empty glumes, and longer awn usually twisted at the base. I have seen few specimens, and these all from one locality. It is not improbable that further investigations may reduce the plant to a variety of *D. oreophila.*

10. **D. pilosa** *R. Br. Prodr.* (1810) 177.—Culms tufted, slender, glabrous or sparingly pilose, leafy at the base, 1–2 ft. high, rarely more. Leaves usually much shorter than the culms, narrow, often setaceous, involute or rarely flat, glabrous or pilose with spreading hairs; sheaths narrow, grooved, pilose or glabrous; ligules reduced to a transverse band of long soft hairs. Panicle 1–4 in. long, usually narrow and contracted, sometimes racemiform; branches short, erect. Spikelets about ½ in. long, 4–8-flowered. Two outer glumes exceeding the flowering glumes, subequal, lanceolate, acute, membranous, 7-nerved. Flowering glumes 7–9-nerved, deeply 2-lobed at the tip, the lobes produced into fine awns as long or longer than the glume, central awn from between the lobes, exserted beyond the spikelet, flattened and spirally twisted and often dark-coloured at the base, a tuft of silky hairs at the base of the callus or pedicel of the glume, a tuft on the margin on each side above the callus, sometimes connected by hairs on the back, and another marginal tuft on each side opposite to the base of the lobes, the sides and back between usually glabrous. Palea broad, obtuse or shortly bifid at the tip.—*Hook. f. Fl. Nov. Zel.* i (1853) 303; *Fl. Tasm.* ii (1860) 120; *Benth. Fl. Austral.* vii (1878) 594; *Buch. N.Z. Grasses* (1879) t. 33; *Cheesem. Man. N.Z. Fl.* (1906) 890. D. semiannularis *var.* pilosa *Hook. f. Handb. N.Z. Fl.* (1864) 333. D. nervosa *Col. in Trans. N.Z. Inst.* xxviii (1896) 612 (*not of Hook. f.*).

Arundo semiannularis Labill. 1:26 t. 33. 1804.
Danth. " " var. unarede (Raoul) Hook.
Arundo penicillata Labill. 1804, 26–34. 1855. 334
Danthonia " GRAMINEAE.) F.N.Z. [Danthonia.

Var. **racemosa** *Buch. N.Z. Grasses* (1879) t. 33(2)B.—Culms very slender, drooping. Panicle reduced to a slender raceme of 4–10 almost sessile spikelets.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant throughout. Sea-level to 4000 ft.

D. pilosa is technically distinguished from *D. semiannularis* by the absence of the transverse ring of hairs on the flowering glume just below the lobes. In the typical state this ring is reduced to a small tuft of hairs on each margin of the glume, the sides and back between the tufts being quite glabrous. But occasionally there are a few hairs on the back of the glume as well, and sometimes these become so numerous as almost to form a transverse ring, thus breaking down the distinction between the two species. *D. pilosa* is also found in Australia, ranging from Queensland to Tasmania and West Australia.

(Labill)

11. **D. semiannularis** *R. Br. Prodr.* (1810) 177.—Very variable in size, usually 1–2 ft. high, but often dwarfed to a few inches, and sometimes attaining 3 ft. Culms tufted, slender, smooth, glabrous or sparingly pilose. Leaves shorter than the culms, narrow, flat or involute, often almost setaceous; sheaths grooved, glabrous or pilose with long spreading hairs; ligules reduced to a narrow transverse band of soft silky hairs, those on the outside the longest. Panicle 1–4 in. long, usually compact and more or less contracted; branches few, short, erect. Spikelets $\frac{1}{4}$–$\frac{1}{2}$ in. long without the awns, 3–8-flowered. Two outer glumes exceeding the flowering glumes, subequal, lanceolate, acute, membranous, 5–7-nerved. Flowering glumes 7–9-nerved, deeply 2-lobed at the tip, the lobes produced into fine awns often as long as the glume, central awn from between the lobes, usually exserted beyond the spikelet, flat and spirally twisted at the base, a ring of short silky hairs around the glume at the base, and a transverse ring of longer hairs (often arranged in separate tufts) just below the base of the lobes. Palea exceeding the base of the awn, narrow-oblong.—*Hook. f. Fl. Nov. Zel.* i (1853) 304; *Handb. N.Z. Fl.* (1864) 333; *Benth. Fl. Austral.* vii (1878) 595; *Buch. N.Z. Grasses* (1879) t. 34; *Cheesem. Man. N.Z. Fl.* (1906) 890. D. unarede *Raoul Choix* (1846) 11, t. 4. D. gracilis *Hook. f. Fl. Nov. Zel.* i (1853) 303, t. 69B.

CKn. N.Z.J. Ag. 23 (1902) 146

Var. **setifolia** *Hook. f. Fl. Nov. Zel.* i (1853) 304.—Culms more densely tufted. Leaves very narrow, terete from the strongly involute margins, strict, wiry, erect. Panicle smaller, with fewer spikelets. Flowering glumes less copiously silky, the hairs of the upper transverse band shorter.—D. semiannularis *var.* alpina *Buch. in Trans. N.Z. Inst.* iv (1872) 225; *N.Z. Grasses* (1879) t. 34(2)A.

Var. **nigricans** *Petrie in Trans. N.Z. Inst.* ~~xxxvi~~ (1914) 37.—Differs from var. *setifolia* in the shorter spikelets, smaller florets, and in the empty glumes being blackish-brown with a scarious margin.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout, var. *setifolia* in mountainous situations, ascending to over 5000 ft. Var. *nigricans:* Mount Hector (Tararua Range); Waimangaroa, Millerton, Burnett's Face, and other localities near Westport; Lake Harris (Lake County), *Petrie!*

Also abundant throughout the whole of temperate Australia. In New Zealand this species and *D. pilosa* are now largely sown as pasture-grasses, especially in the northern part of the colony. On stiff clay soils they are far more permanent than most introduced species, and might with advantage be substituted for them.

12. **D. Buchanani** *Hook. f. Handb. N.Z. Fl.* (1864) 333.—Culms tufted, slender, smooth, quite glabrous, 3–12 in. high. Leaves mostly at the base of the stems and much shorter than them, strict, erect, wiry, very narrow, involute, filiform or nearly so; sheaths pale, glabrous, deeply grooved; ligules reduced to a band of short white hairs. Panicle small, contracted, $\frac{3}{4}$–2 in. long, of 4–12 spikelets; branches few, scaberulous. Spikelets pale-

D. gracilis Hook. 1855 p. 303
var nigricans (Petrie) Zotov.

(D. nigricans (Pet.) Calder Trans. Linn. Soc. Bot. 51: 1937: p. 8.

green, $\frac{1}{4}$–$\frac{1}{3}$ in. long, 3–5-flowered. Two outer glumes exceeding the flowering glumes and often the awns as well, subequal, oblong-lanceolate, acute, 3–5-nerved. Flowering glumes 7–9-nerved, 2-lobed at the tip, the lobes produced into short awns, central awn from between the lobes, short, hardly equalling the length of the glume, straight or bent, not at all or very obscurely twisted at the base, a tuft of silky hairs at the base of the glume and on the margins higher up, usually connected by straggling hairs on the back and sides, forming an indistinct transverse ring. Palea oblong, 2-nerved; nerves ciliate.—*Cheesem. Man. N.Z. Fl.* (1906) 891.

Var. **tenuis** *Petrie in Trans. N.Z. Inst.* xlvi (1914) 37.—Leaves setaceo-filiform, shorter than the culms. Panicle linear. Spikelets shorter and narrower than the type!

SOUTH ISLAND: Canterbury—Upper Waimakariri, *T. Kirk! Petrie! T. F. C.;* Mount Torlesse, *Petrie!* Mount Arrowsmith, *Cockayne.* Otago—Lake district, *Hector* and *Buchanan!* Kurow, Mount Ida, Macrae's, Pembroke, Bendigo, Lake Te Anau, *Petrie!* Southland, *Crosby Smith.* 1000–3000 ft. Var. *tenuis:* Not uncommon in the

grooved. Panicle small, ovate or oblong, $\frac{3}{4}$–$1\frac{3}{4}$ in. long, of 6–15 spikelets; branches few, short, pubescent. Spikelets $\frac{1}{5}$–$\frac{1}{6}$ in. long, 2–3-flowered. Two outer glumes subequal, exceeding the flowering glumes and awns, oblong-lanceolate, acute. Flowering glumes very shortly bifid at the top, intermediate awn short, straight, about $\frac{1}{3}$–$\frac{1}{4}$ the length of the glume; two short tufts of hairs on each side near the margin of the glume, with a tuft at the base of the glume, and a few scattered hairs across the back.—*Handb. N.Z. Fl.* (1864) 333 (*but not of Buch. N.Z. Grasses*, t. 36A, *or of Cheesem. Man. N.Z. Fl.* (1906) 892). T.N.Z.I. 2?: 587 & 44: 108.

NORTH ISLAND: Ruahine Range, *W. Colenso!* Tararua Range, *B. C. Aston!* near Waiouru, *Petrie!*

As remarked by Hooker, this is not at all a characteristic species of *Danthonia*, differing in the very short erect awn, which is never twisted at the base, and in the much less evident lateral awns.

24. **ELEUSINE** Gaertn. 1788

Annual or perennial grasses. Leaves long, flat or folded, firm or membranous. Spikelets 3- to many-flowered, laterally compressed, sessile and densely imbricate in 2 rows on one side of a flattened rhachis, forming linear spikes; spikes digitately arranged or irregularly scattered; rhachilla disarticulating above the outer glumes. Two outer glumes shorter than the flowering glumes, persistent, empty, unequal, keeled, obtuse or mucronate, membranous, 3–5-nerved. Flowering glumes similar to the outer glumes, 3-nerved at the base. Palea shorter than the glumes, complicate and 2-keeled. Lodicules 2, minute. Stamens 3; anthers short. Styles short, distinct; stigmas plumose. Grain broadly oblong, grooved; pericarp lax, hyaline.

Species 6, most plentiful in tropical Asia and Africa, the one found in the New Zealand area a weed in all warm countries.

Arundo semiannularis Labill. 1:26 t. 33. 1804.
Danth. " " var. unarede (Raoul) Hook.
Arundo pericillata Labill. 1804, 26–34. 1855. 334
178 Danthonia " GRAMINEAE.) F.N.Z. [Danthonia.

Var. **racemosa** *Buch. N.Z. Grasses* (1879) t. 33(2)B.—Culms very slender, drooping. Panicle reduced to a slender raceme of 4–10 almost sessile spikelets.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant throughout. Sea-level to 4000 ft.

D. pilosa is technically distinguished from *D. semiannularis* by the absence of the transverse ring of hairs on the flowering glume just below the lobes. In the typical state this ring is reduced to a small tuft of hairs on each margin of the glume, the sides and back between the tufts being quite glabrous. But occasionally there are a few hairs on the back of the glume as well, and sometimes these become so numerous as almost to form a transverse ring, thus breaking down the distinction between the two species. *D. pilosa* is also found in Australia, ranging from Queensland to Tasmania and West Australia.

(Labill)

11. **D. semiannularis** *R. Br. Prodr.* (1810) 177.—Very variable in size, usually 1–2 ft. high, but often dwarfed to a few inches, and sometimes attaining 3 ft. Culms tufted, slender, smooth, glabrous or sparingly pilose. Leaves shorter than the culms, narrow, flat or involute, often almost

Danthonia setifolia (Hook.f.) Ckn. =
(D. semiannularis, var. setifolia Hook.)
T.N.Z.I. vol. 57, p. 52. Ckn. & Allan.
D.

or longer hairs (often arranged in separate tufts) just below the base of the lobes. Palea exceeding the base of the awn, narrow-oblong.—*Hook. f. Fl. Nov. Zel.* i (1853) 304; *Handb. N.Z. Fl.* (1864) 333; *Benth. Fl. Austral.* vii (1878) 595; *Buch. N.Z. Grasses* (1879) t. 34; *Cheesem. Man. N.Z. Fl.* (1906) 890. D. unarede *Raoul Choix* (1846) 11, t. 4. D. gracilis *Hook. f. Fl. Nov. Zel.* i (1853) 303, t. 69B.

Ckn. N.Z.J. Ag. 23 (1912) 148.

Var. **setifolia** *Hook. f. Fl. Nov. Zel.* i (1853) 304.—Culms more densely tufted. Leaves very narrow, terete from the strongly involute margins, strict, wiry, erect. Panicle smaller, with fewer spikelets. Flowering glumes less copiously silky, the hairs of the upper transverse band shorter.—D. semiannularis *var.* alpina *Buch. in Trans. N.Z. Inst.* iv (1872) 225; *N.Z. Grasses* (1879) t. 34(2)A.

Var. **nigricans** *Petrie in Trans. N.Z. Inst.* ~~xxxvi~~ (1914) 37.—Differs from var. *setifolia* in the shorter spikelets, smaller florets, and in the empty glumes being blackish-brown with a scarious margin.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout, var. *setifolia* in mountainous situations, ascending to over 5000 ft. Var. *nigricans:* Mount Hector (Tararua Range); Waimangaroa, Millerton, Burnett's Face, and other localities near Westport; Lake Harris (Lake County), *Petrie!*

Also abundant throughout the whole of temperate Australia. In New Zealand this species and *D. pilosa* are now largely sown as pasture-grasses, especially in the northern part of the colony. On stiff clay soils they are far more permanent than most introduced species, and might with advantage be substituted for them.

12. **D. Buchanani** *Hook. f. Handb. N.Z. Fl.* (1864) 333.—Culms tufted, slender, smooth, quite glabrous, 3–12 in. high. Leaves mostly at the base of the stems and much shorter than them, strict, erect, wiry, very narrow, involute, filiform or nearly so; sheaths pale, glabrous, deeply grooved; ligules reduced to a band of short white hairs. Panicle small, contracted, ¾–2 in. long, of 4–12 spikelets; branches few, scaberulous. Spikelets pale-

D. gracilis Hook. 1855 p. 303
var nigricans (Petrie) Zotov.

(D. nigricans (Pet.) Calder Journ. Linn. Soc. Bot. 51: 1937: p. 5.

green, $\frac{1}{4}$–$\frac{1}{3}$ in. long, 3–5-flowered. Two outer glumes exceeding the flowering glumes and often the awns as well, subequal, oblong-lanceolate, acute, 3–5-nerved. Flowering glumes 7–9-nerved, 2-lobed at the tip, the lobes produced into short awns, central awn from between the lobes, short, hardly equalling the length of the glume, straight or bent, not at all or very obscurely twisted at the base, a tuft of silky hairs at the base of the glume and on the margins higher up, usually connected by straggling hairs on the back and sides, forming an indistinct transverse ring. Palea oblong, 2-nerved; nerves ciliate.—*Cheesem. Man. N.Z. Fl.* (1906) 891.

Var. **tenuis** *Petrie in Trans. N.Z. Inst.* xlvi (1914) 37.—Leaves setaceo-filiform, shorter than the culms. Panicle linear. Spikelets shorter and narrower than the type!

SOUTH ISLAND: Canterbury—Upper Waimakariri, *T. Kirk! Petrie! T. F. C.;* Mount Torlesse, *Petrie!* Mount Arrowsmith, *Cockayne.* Otago—Lake district, *Hector* and *Buchanan!* Kurow, Mount Ida, Macrae's, Pembroke, Bendigo, Lake Te Anau, *Petrie!* Southland, *Crosby Smith.* 1000–3000 ft. Var. *tenuis:* Not uncommon in the interior of Otago, *Petrie.*

Very closely allied to *D. semiannularis,* with which Professor Hackel is disposed to unite it. But the spikelets are smaller, the awns shorter, often not exserted beyond the outer glumes, and the flowering glume is shorter and broader, and more sparingly silky. The plant figured by Mr. Buchanan in his New Zealand Grasses (t. 35) as *Danthonia Buchanani* is a slender form of *Hierochloe redolens.*

13. **D. nuda** *Hook. f. Fl. Nov. Zel.* ii (1855) 337.—Culms slender, leafy, often much branched and decumbent at the base, erect above, 4–12 in. high, smooth and glabrous. Leaves shorter than the culms, involute, filiform; ligules reduced to a few long silky hairs; sheaths long, pale, grooved. Panicle small, ovate or oblong, $\frac{3}{4}$–$1\frac{1}{4}$ in. long, of 6–15 spikelets; branches few, short, pubescent. Spikelets $\frac{1}{5}$–$\frac{1}{6}$ in. long, 2–3-flowered. Two outer glumes subequal, exceeding the flowering glumes and awns, oblong-lanceolate, acute. Flowering glumes very shortly bifid at the top, intermediate awn short, straight, about $\frac{1}{3}$–$\frac{1}{4}$ the length of the glume; two short tufts of hairs on each side near the margin of the glume, with a tuft at the base of the glume, and a few scattered hairs across the back.—*Handb. N.Z. Fl.* (1864) 333 (*but not of Buch. N.Z. Grasses,* t. 36A, *or of Cheesem. Man. N.Z. Fl.* (1906) 892). T.N.Z.I. 22: 587 & 44: 108.

NORTH ISLAND: Ruahine Range, *W. Colenso!* Tararua Range, *B. C. Aston!* near Waiouru, *Petrie!*

As remarked by Hooker, this is not at all a characteristic species of *Danthonia,* differing in the very short erect awn, which is never twisted at the base, and in the much less evident lateral awns.

24. **ELEUSINE** Gaertn. 1766

Annual or perennial grasses. Leaves long, flat or folded, firm or membranous. Spikelets 3- to many-flowered, laterally compressed, sessile and densely imbricate in 2 rows on one side of a flattened rhachis, forming linear spikes; spikes digitately arranged or irregularly scattered; rhachilla disarticulating above the outer glumes. Two outer glumes shorter than the flowering glumes, persistent, empty, unequal, keeled, obtuse or mucronate, membranous, 3–5-nerved. Flowering glumes similar to the outer glumes, 3-nerved at the base. Palea shorter than the glumes, complicate and 2-keeled. Lodicules 2, minute. Stamens 3; anthers short. Styles short, distinct; stigmas plumose. Grain broadly oblong, grooved; pericarp lax, hyaline.

Species 6, most plentiful in tropical Asia and Africa, the one found in the New Zealand area a weed in all warm countries.

1. **E. indica** *Gaertn. Fruct.* i, 8.—Annual. Culms tufted, erect or decumbent at the base, branched, stout or slender, compressed, quite glabrous, 9–24 in. high. Leaves numerous, distichous, 4–9 in. long, $\frac{1}{8}$–$\frac{1}{3}$ in. broad, flat, rather flaccid, acuminate; sheaths compressed, pale, margins ciliate; ligules almost obsolete. Spikes rather slender, straight, $1\frac{1}{2}$–3 in. long, usually 3–6 in a terminal umbel, generally one inserted lower down; rhachis smooth or pubescent at the base. Spikelets about $\frac{1}{6}$ in. long, densely imbricated, 3–6-flowered. Two outer glumes unequal, the lower small, 1-nerved; the upper 3–5-nerved. Flowering glumes much larger, ovate when spread out, acute, 3-nerved. Grain oblong; pericarp very lax and membranous, enclosing the rugose seed.—*Benth. Fl. Austral.* vii (1878) 615; *Cheesem. in Trans. N.Z. Inst.* xx (1888) 176; *Man. N.Z. Fl.* (1906) 892.

KERMADEC ISLANDS: Lower portions of Sunday Island and on Meyer Island, plentiful and apparently indigenous, *T. F. C., W. R. B. Oliver!* NORTH AND SOUTH ISLANDS: Naturalized near Auckland, *Sinclair*, and at Westport, *W. Townson!*

25. ARUNDO Linn.

Tall perennial reed-like grasses. Culms densely tufted, stout, almost woody at the base. Leaves flat. Spikelets numerous, laterally compressed, 2–7-flowered, arranged in large decompound panicles; rhachilla disarticulating above the two outer glumes and between the flowering glumes. Two outer glumes persistent, empty, subequal, lanceolate, acuminate, membranous, glabrous. Flowering glumes ovate-lanceolate, 3–5-nerved, pilose along the back and towards the base with long silky hairs, 2-fid at the apex, with a cuspidate point or awn from between the lobes. Palea short, hyaline, 2-nerved. Lodicules 2, obovate. Stamens 3. Ovary glabrous; styles distinct; stigmas plumose. Grain oblong, free within the flowering glume and palea.

A small genus of 10 or 12 species, dispersed through most tropical and warm-temperate regions. The two species found in New Zealand are endemic.

Two outer glumes including the flowering glumes and their awns.
Flowering glumes deeply bifid, the divisions long and bristle-pointed .. .. 1. *A. conspicua.*

Two outer glumes shorter than the awns of the flowering glumes.
Flowering glumes not so deeply bifid, the divisions scarcely bristle-pointed .. .. 2. *A. fulvida.*

1. **A. conspicua** *Forst. f. Prodr.* (1786) n. 48.—Forming huge dense tussocks with numerous long curving leaves. Culms 3–10 ft. high, as thick as the finger at the base, slender, erect, smooth, hollow. Leaves long, narrow, coriaceous, flat or involute, strongly nerved, smooth or scabrid along the margins and on the nerves of the upper surface; sheaths long, smooth; ligules reduced to a transverse band of short stiff hairs. Panicle very handsome, silky-white or yellowish-white, copiously branched, 1–2 ft. long; branches drooping, very many-spiculate, smooth or pilose-scabrid. Spikelets 1–3-flowered, on short capillary pedicels. Two outer glumes subequal, $\frac{3}{4}$–$1\frac{1}{2}$ in. long, longer than or at least equalling the awns of the flowering glumes, narrow-lanceolate, gradually tapering into long acuminate points, membranous, 1-nerved, usually with a very short lateral nerve on each side near the base. Flowering glumes hyaline, 3-nerved, lower half densely clothed with long silky hairs, deeply 2-fid at the tip, the

divisions produced into bristle-like awns; central awn from between the divisions, long, slender, scabrid. Palea shorter than the glume, pubescent on the nerves.—*Hook. f. Fl. Nov. Zel.* i (1853) 299; *Handb. N.Z. Fl.* (1864) 341; *Buch. N.Z. Grasses* (1879) t. 27; *Bot. Mag.* t. 6232; *Cheesem. Man. N.Z. Fl.* (1906) 893. A. australis *A. Rich. Fl. Nouv. Zel.* (1832) 121; *A. Cunn. Precur* (1836) n. 265. A. Kakao *Steud. Syn. Pl. Glum.* (1855) 194. Calamagrostis conspicua *Gmel. Syst.* (1791) 172. Achnantherum conspicuum *Beauv. Agrost.* (1812) 146. Agrostis conspicua *Roem. and Schult. Syst.* ii (1817) 364; *A. Rich. Fl. Nouv. Zel.* (1832) 127; *A. Cunn. Precur.* (1836) n. 250; *Raoul Choix* (1846) 39.

North and South Islands, Stewart Island, Chatham Islands: Abundant throughout in damp lowland situations. *Toetoe-Kakaho;* culms of, *Kakaho.*

The largest grass in the colony, forming a very characteristic feature of the vegetation in all swampy tracts, river-banks, sandhills, &c. The culms were formerly largely used by the Maoris for lining their meeting-houses, and were often dyed in elaborate patterns.

2. **A. fulvida** *Buch. in Trans. N.Z. Inst.* vi (1874) 242.—Habit and general appearance of *A. conspicua*, but rather smaller, culms seldom more than 6 ft. high. Panicle pale-fulvous, usually more compact, broader and more erect, 1–2 ft. long. Spikelets 1–3-flowered. Two outer glumes shorter, $\frac{1}{3}$–$\frac{2}{3}$ in. long, not drawn out into such long points, and usually considerably shorter than the awns of the flowering glumes. Flowering glumes not so deeply bifid at the tip, the divisions scarcely awned; central awn exserted beyond the outer glumes.—*Buch. N.Z. Grasses* (1879) t. 28; *Cheesem. Man. N.Z. Fl.* (1906) 894. A conspicua *var.* fulvida *T. Kirk in Trans. N.Z. Inst.* x, App. (1878) 43.

North and South Islands: From the Bay of Islands to Foveaux Strait, not nearly so abundant as *A. conspicua.*

This does not differ from *A. conspicua* except in the outer glumes not including the awns of the flowering glumes, and in the terminal lobes of the flowering glumes being shorter and scarcely awned. But these differences are easily recognized and well marked, and probably the species should be maintained.

26. **TRIODIA** R. Br.

Perennial grasses, of very various habit. Leaves narrow, rigid. Spikelets 2- to many-flowered, arranged in a lax or narrow panicle; rhachilla disarticulating above the 2 outer glumes and between the flowering glumes. Two outer glumes longer or shorter than the flowering glumes, somewhat rigid, empty, keeled, acute, awnless. Flowering glumes more or less imbricated, rounded on the back at the base, coriaceous or chartaceous, often hairy on the margins and callus, 3-nerved, 3-lobed or 3-toothed at the apex, the lobes equal or the central one produced into a short awn or mucro. Palea broad, thin, with 2 almost marginal keels. Lodicules 2. Stamens 3. Styles short, distinct; stigmas plumose. Grain usually compressed on the back, free within the flowering glume and palea.

Species from 25 to 30, mostly in the temperate regions of both hemispheres, a few in tropical America. The New Zealand species belong to the subgenus *Rhombolytrum,* characterized by the lateral teeth of the flowering glume being very small or almost obsolete, the middle tooth being also small and mucronate. It contains a few Chilian and North American species in addition to the five found in New Zealand, all of which are endemic.

Densely matted; culms 1–3 in. Panicle often reduced to a single spikelet. Outer glumes ovate. Flowering glumes silky on the margins, distinctly 3-toothed at the apex .. .. .. 1. *T. exigua.*

Culms tufted, 2–6 in. Panicle of 8–12 spikelets. Outer glumes lanceolate. Flowering glumes sparsely silky, 5–7-nerved, minutely 3-toothed at the apex .. .. 2. *T. pumila.*
Culms tufted, 4–12 in. Panicle of 6–16 spikelets. Outer glumes oblong-lanceolate. Flowering glumes silky at the base, and with two tufts on the margin on each side.. .. .. 3. *T. Thomsoni.*
Culms tufted, 2–4 in. Panicle of 6–15 spikelets. Outer glumes broadly ovate. Flowering glumes glabrous, 9-nerved, obscurely 3-toothed or irregularly erose at the apex .. .. 4. *T. australis.*
Culms tufted, 2½–5 in. Panicle of 6–16 spikelets. Outer glumes oblong, obtuse. Flowering glumes glabrous, ovate, 5-nerved, minutely 3-toothed or irregularly erose at the tip .. .. 5. *T. macquariensis.*

Danthonia Zotov. Trans 73: 234.

1. **T. exigua** (*T. Kirk*) *in Trans. N.Z. Inst.* xiv (1882) 378.—Small, densely matted, forming a compact sward. Rhizomes long, creeping, branched. Culms erect from the rhizome, slender, wiry, glabrous, 1½–4 in. high. Lower leaves reduced to sheathing scales; upper shorter than the culms, ½–2 in. long, very narrow, convolute, filiform, rigid, erect or curved, acute or almost pungent at the tip, quite glabrous; sheaths closely appressed, pale, membranous, grooved; ligules reduced to a line of short stiff hairs. Panicle frequently reduced to a single spikelet, sometimes 2–3, rarely as many as 4–5; pedicels short, slender, minutely scaberulous. Spikelets about ⅕ in. long, ovoid-oblong, 2–4-flowered. Two outer glumes subequal, as long as the flowering glumes or very slightly shorter than them, concave, ovate, subacute, rigid, the lower one 5-nerved, the upper 7-nerved. Flowering glumes broadly ovate, silky on the margins and back towards the base, minutely scaberulous above, 9-nerved, shortly 3-toothed at the apex, the middle tooth mucroniform, not much longer than the lateral teeth. Palea broad, ciliate on the keels.—*Cheesem. Man. N.Z. Fl.* (1906) 895. Danthonia pauciflora *Buch. N.Z. Grasses* (1879) t. 36B (*not of R. Br.*).

South Island: Nelson—Clarence Valley, *T. F. C.* Canterbury—Upper Waimakariri and Broken River, *J. D. Enys! T. Kirk! Cockayne! T. F. C.*; Mount Peel, *H. H. Allan!* Otago—Not uncommon in the dry plains of the central and north-western portions of the district, *Petrie!* 500–3000 ft.

A curious little species, with much of the habit of small states of *Zoysia pungens.*

*D. Kirkii Zotov.

2. **T. pumila**, *Hack. MSS.*—Culms tufted, slender, glabrous, much branched at the base, 2–8 in. high. Leaves shorter than the culms, very narrow, involute, filiform, strict, erect, 1–2 in. long; sheaths pale, membranous, deeply grooved, glabrous or sparingly pilose with long soft hairs; ligules reduced to a transverse ring of hairs. Panicle ½–1 in. long, strict, erect, much contracted, of 3–15 spikelets; branches very short, erect, pubescent. Spikelets ⅙–⅕ in. long, lanceolate, 2–3-flowered. Two outer glumes exceeding the flowering glumes, subequal, lanceolate, acute or subacute, 3–5-nerved. Flowering glumes broadly ovate, sparsely silky-pilose on the margins and back, faintly 5–7-nerved, minutely 3-toothed at the apex, the central tooth mucroniform. Palea bifid at the tip, 2-keeled, ciliolate on the keels.—*Cheesem. Man. N.Z. Fl.* (1906) 896. Atropis pumila *T. Kirk in Trans. N.Z. Inst.* xiv (1882) 379.

South Island: Canterbury—Upper Waimakariri and Broken River, *T. Kirk! T. F. C.*; Mount Peel, *H. H. Allan!* mountains near Lake Tekapo, *T. F. C.* Otago—Not uncommon in mountainous districts, *Buchanan! Petrie! T. Kirk! B. C. Aston!* Altitudinal range usually from 2000 to 5000 ft., but descending to sea-level in the south of Otago.

Hebe 3 See Zotov.

* = T. pumila (Kirk) Hack. ex Cheesem.
= atropis pumila Kirk
non. D. pumila Hees 1841.

Referred to *Atropis* by Mr. Kirk, but clearly a *Triodia*, and closely allied to the following species, from which it differs in the longer and narrower spikelets, narrow outer glumes, and silky flowering glumes, which are distinctly though minutely 3-toothed at the apex.

3. **T. Thomsoni** *Petrie in Trans. N.Z. Inst.* xliv (1912) 188.—Culms slender, tufted, branched at the base, quite glabrous, 4–12 in. high. Leaves much shorter than the culms, involute, filiform, quite smooth and glabrous; sheaths pale, grooved; ligules reduced to a band of silky hairs. Panicle small, erect, contracted, ½–1½ in. long, of 6–16 spikelets; branches few, short, pubescent. Spikelets greenish-white, small, narrow, 3–7-flowered. Two outer glumes usually exceeding the flowering-glumes and awns, subequal, oblong-lanceolate, acute, 3–5-nerved. Flowering glumes short and broad, ovate, 7–9-nerved, very shortly bifid at the tip, central awn from between the lobes, very short, ⅙–⅛ the length of the glume, not twisted at the base, a tuft of silky hairs at the base of the glume, and two small marginal tufts (sometimes confluent) on each side higher up, back of glume glabrous. Palea oblong, shorter than the glume.—Danthonia Thomsoni *Buch. N.Z. Grasses* (1879) t. 36 (2). Danthonia nuda *Cheesem. Man. N.Z. Fl.* (1906) 892 (*not of Hook. f.*).

South Island: Nelson—Mount Arthur Plateau, *T. F. C.* Marlborough—Endeavour Inlet, *J. H. Macmahon!* Canterbury—Broken River basin, *Petrie! T. F. C.*; Poulter River, *Cockayne!* Lake Tekapo, *T. F. C.* Otago—Common in dry places in the eastern and central portions of the district, *Buchanan! Petrie!*

In the first edition of this book I confounded this species with *Danthonia nuda*, a plant with which I was not then acquainted and which has proved to be altogether distinct.

4. **T. australis** *Petrie in Trans. N.Z. Inst.* xxii (1890) 442.—Culms densely tufted, much branched at the base, erect or spreading, quite glabrous, leafy below, 2–4 in. high. Leaves usually shorter than the culms, narrow, involute, filiform, deeply striate; sheaths broad, grooved, pale; ligules reduced to a narrow band of short white hairs with a longer tuft on each side. Panicle small, strict, erect, contracted, ½–¾ in. long, of 6–15 spikelets; branches 4–6, short, pubescent. Spikelets about ⅛ in. long, 2–4-flowered. Two outer glumes rather shorter than the flowering glumes, subequal, broadly ovate, obtuse, 7-nerved; margins broad, pale. Flowering glumes very broadly ovate or rounded, glabrous, firm, 9-nerved, minutely and irregularly 3-toothed or erose at the tip. Palea broad, 2-keeled, the keels ciliolate.—*Cheesem. Man. N.Z. Fl.* (1906) 896.

Var. **mucronulata** *Hack. MSS.*—Sheaths pilose with long hairs. Spikelets 3-5-flowered, the outer glumes distinctly shorter than the flowering glumes, which are more evidently 3-toothed, the middle tooth produced into a short mucro.

South Island: Otago—Sides of mountain-streams, Clark's Diggings, Mount Cardrona, Old Man Range, Maungatua, Blue Mountains, *Petrie!* Var. *mucronulata*: Swamps in the Tasman Valley, Canterbury, *T. F. C.* 2000–5000 ft.

5. **T. macquariensis** *Cheesem. in Vascl. Fl. Macquarie Is.* (1919) 34 (*Austral. Antarct. Exped.* vol. 7, part 3).—Apparently perennial, tufted, often forming dense patches, smooth and glabrous. Culms numerous, erect or geniculate at the base, 2½–5 in. high, leafy to the base of the panicle. Leaves equalling the culms or longer than them, rather narrow, $\frac{1}{10}$–$\frac{1}{20}$ in. broad, deeply striate, quite glabrous, flat or involute, margins thickened, tips obtuse, callous; ligules broad-ovate, thin and membranous;

sheaths unusually long, much broader than the blades, sometimes as much as $\frac{1}{6}$ in. across, smooth, pale and membranous. Panicle narrow, glabrous, $\frac{3}{4}$–$1\frac{1}{2}$ in. long; branches few, short, erect. Spikelets 6–15, 3–5-flowered, $\frac{1}{5}$–$\frac{1}{6}$ in. long, the lower flowers sessile at the base of the spikelet, the upper usually remote from one another. Empty glumes unequal, the lower $\frac{1}{2}$–$\frac{2}{3}$ the length of the upper, glabrous, oblong, obtuse, 3-nerved. Flowering glumes ovate or broadly ovate-oblong, rounded at the back, not keeled, 5-nerved, glabrous or very faintly pubescent on the nerves, minutely 3-toothed at the tip or irregularly erose. Palea broad, 2-keeled, the keels ciliolate. Lodicules 2, acute.

Macquarie Island: Common on the coast, in crevices in the bare rock or on the cliffs, *H. Hamilton!* (Mawson Expedition).

A puzzling plant to place. It differs from *Poa* mainly in the flowering glumes being rounded on the back, and minutely 3-toothed (or irregularly erose) at the tip. It agrees with *Atropis* in the flowering glumes being rounded on the back, but differs in habit and in the 3-toothed tip of the flowering glume. Although it is not a typical *Triodia*, it must be kept in the vicinity of the New Zealand *T. australis*, which is its nearest ally.

27. **KOELERIA** Pers.

Perennial or annual grasses. Leaves narrow; ligules hyaline. Spikelets 2–5-flowered with the uppermost flower sterile, laterally compressed, shining, densely crowded in spike-like panicles; rhachilla disarticulating above the outer glumes and between the flowering glumes, produced beyond the uppermost flower. Two outer glumes persistent, empty, unequal, keeled, acute or acuminate, margins hyaline. Flowering glumes exceeding the outer glumes, with broader hyaline margins, 3–5-nerved, entire or bifid, acuminate or mucronate or shortly awned. Palea white and hyaline, 2-toothed. Lodicules 2. Stamens 3. Styles short, distinct; stigmas plumose. Grain oblong, laterally compressed, free within the flowering glume and palea.

Species 12 or 15, mainly in the temperate parts of the Northern Hemisphere, rarer in the South Temperate Zone. The single New Zealand species is also found in South America.

1. **K. Kurtzii** *Hack. in Bolet. Acad. Sc. de Cordoba*, xvi (1900) 261.—Culms densely tufted, erect, slender, glabrous or pubescent, 6–24 in. high. Leaves crowded near the base of the culms, 2–9 in. long, $\frac{1}{6}$–$\frac{1}{8}$ in. broad, flat, soft or almost flaccid, glabrous or more or less pubescent, sometimes almost villous; sheaths long, rather tight, striate, pubescent or villous; ligules short, truncate, ciliolate. Panicle 1–5 in. long, cylindric, usually dense and spike-like, but sometimes irregularly interrupted or lobed; branches short, erect, minutely villous-pubescent. Spikelets pale-green or pale purplish-green, shining, about $\frac{1}{5}$ in. long, 2–3-flowered. Two outer glumes broadly lanceolate, hyaline, acute, 3-nerved, often scabrid on the keel. Flowering glumes oblong-lanceolate, glabrous or minutely rough on the back, 5-nerved, tip minutely 2-toothed or almost entire, with a very short scabrid awn inserted just below the teeth.—*Cheesem. Man. N.Z. Fl.* (1906) 897. K. cristata *Hook. f. Fl. Nov. Zel.* i (1853) 305; *Handb. N.Z. Fl.* (1864) 334; *Buch. N.Z. Grasses* (1879) t. 38 (*not of Pers.*). K. micrathera *Griseb. in. Goett. Abh.* xxi (1879) 292 (*but not* Trisetum micratherum *Desv.*).

See Domin for new spp. of Koeleria

North Island: Kaimanawa Ranges, *B. C. Aston!* South Island: Abundant in hilly and mountainous localities throughout. Sea-level to 4500 ft.

Also in temperate South America (Argentina), and probably also in Australia. Professor Hackel distinguishes it from the northern *K. cristata* by the flowering glume being minutely 2-toothed at the apex with a short awn protruding from below the sinus, whereas in *K. cristata* the flowering glume is entire and not awned. I find that the awn varies much in length, and is frequently almost obsolete.

Since the first edition of this work was published an elaborate monograph of the genus has been prepared by Dr. Karl Domin. In it the author has increased the number of species admitted in the "Genera Plantarum" (12) and the "Pflanzenfamilien" (15) to no less than 61, and even then he is careful to state that several of these are "collective species," and that the full number is 89. Moreover, many of his "species" are further separated into subspecies, varieties, subvarieties, forms, &c. Domin's account of the variable *K. cristata* covers no less than 65 pages of his monograph. The single New Zealand species, which Professor Hackel has assured me "is quite identical" with the South American *K. Kurtzii*, Dr. Domin not only separates from that plant, but divides it into three species confined to New Zealand. These species are mainly, if not altogether, founded on a collection sent by myself to Professor Hackel, all of which he included, without any hesitation, under *K. Kurtzii*. After a careful re-examination, I can make no other disposition of them than that given above. In case any one should wish to identify them, the following key, which I have adopted from Domin's work, may serve the purpose:—

Awn dorsal.	
Small; culms not creeping at the base	1. *K. novo-zelandica.*
Larger; culms creeping at the base	2. *K. superba.*
Awn strictly terminal	3. *K. Gintlii.*

28. **POA** Linn. 1737

Annual or perennial grasses. Leaves flat or convolute; ligules hyaline. Spikelets usually 2–6-flowered, laterally compressed, in lax or contracted rarely spiciform panicles; rhachilla disarticulating above the two outer glumes and between the flowering glumes, glabrous or sparsely hairy. Two outer glumes persistent, empty, keeled, membranous, 1–2-nerved, usually shorter than the flowering glumes. Flowering glumes obtuse or acute, not awned, keeled, 5–7-nerved or rarely 3-nerved, nerves often conniving near the top, callus and marginal nerves often clothed with crisped or tangled woolly hairs. Palea shorter than the flowering glume, 2-keeled. Lodicules 2. Stamens 3. Ovary glabrous; styles short, distinct; stigmas plumose. Grain ovoid or oblong or linear-oblong, compressed, often grooved, free or adherent to the palea; hilum small, basal, punctiform.

A large genus of over 150 species, comprising several important fodder-grasses, abundant in all temperate and cold climates, in the tropics found only on high mountains. The species are in all countries highly variable and difficult of discrimination, but nowhere more so than in New Zealand. Of the 28 species admitted in this work, 2 extend to Australia and Tasmania, the remainder are endemic. In addition to the indigenous species, several others from the Northern Hemisphere are now well established in most districts, the most abundant being *P. annua* Linn., *P. pratensis* Linn., and *P. trivialis* Linn., descriptions of which will be found in any British Flora. The last-mentioned has become even naturalized near the landing-places on the Auckland Islands and Antipodes Island; and on account of the remoteness of the locality has been described as an indigenous species, under the name of *P. antipoda* (Petrie in Subantarct. Is. N.Z. ii (1909) 478).

A. Two outer glumes reaching more than half-way up the flowering glumes immediately above them. Flowering glumes acuminate, often incurved at the tip. Anthers $\frac{1}{15}$–$\frac{1}{10}$ *in. long, linear.*

* Culms few-noded, densely tufted, erect.

Culms 1–4 ft., leafy throughout. Leaves flat, $\frac{1}{3}$–$\frac{3}{4}$ in. broad. Panicle 3–10 in. Flowering glumes prominently 5-nerved. Callus with base of keel and margins villous with crisped hairs	1. *P. foliosa.*

Culms 5–20 in., leafy throughout. Leaves flat, $\frac{1}{6}$–$\frac{1}{4}$ in. broad. Panicle 2–4 in. Flowering glumes 5-nerved, glabrous except a tuft of crisped hairs on the callus .. 2. *P. Hamiltoni.*

Culms 3–18 in., leafy at the base. Panicle 1–4 in. Flowering glumes faintly nerved, glabrous except a tuft of crisped hairs on the callus .. .. 3. *P. novae-zelandiae.*

Culms tall, 2–3 ft. Leaves linear-filiform. Panicle 3–5 in. Spikelets $\frac{1}{3}$ in., 4–5-flowered .. .. 4. *P. litorosa.*

Culms shorter, 12–15 in. Panicle ovate-oblong, 2–2$\frac{1}{2}$ in. Spikelets $\frac{1}{4}$ in., 5–6-flowered .. .. .. 5. *P. Astoni.*

Culms 12–18 in. Panicle very narrow-linear, 2–4 in. Flowering glumes finely acuminate, callus and keel with floccose hairs .. .. 6. *P. oraria.*

** Culms many-noded, decumbent or prostrate at the base, much branched. Panicle narrow.

Culms prostrate or pendent from cliffs, much branched. Leaves flat, flaccid, $\frac{1}{10}$–$\frac{1}{5}$ in. broad. Panicle 1–2 in. long 7. *P. ramosissima.*

Culms creeping or prostrate at the base. Leaves linear, almost filiform. Panicle 2–4 in. long .. .. 8. *P. Guthrie-Smithiana.*

Culms 6–18 in., branched, distichously leafy. Leaves flat or complicate. Panicle 1–3 in. .. .. .. 9. *P. polyphylla.*

B. Two outer glumes reaching more than half-way up the flowering glumes immediately above them. Flowering glumes obtuse or subacute, rarely acute. Anthers $\frac{1}{20}$–$\frac{1}{10}$ in. long, linear.

* Culms long or short; rhizome tufted or stoloniferous. Leaves flat or complicate or involute, not terete nor polished, not specially rigid, never pungent-pointed.

† Rhizome tufted. Ligules reduced to a truncate rim.

Culms 6–36 in., usually stout. Leaves flat or concave, $\frac{1}{10}$–$\frac{1}{4}$ in. broad. Panicle large; branches usually ternate or quinate. Spikelets $\frac{1}{4}$–$\frac{1}{3}$ in. Flowering glumes minutely scaberulous, keel scabrid, callus and lower part of glume with a few crisped hairs .. .. 10. *P. anceps.*

Culms 4–15 in., slender. Leaves narrow, sometimes filiform. Panicle 1$\frac{1}{2}$–3 in., branches usually binate. Spikelets $\frac{1}{6}$–$\frac{1}{5}$ in. Flowering glumes as in *P. anceps* but smoother 11. *P. seticulmis.*

†† Rhizome creeping or stoloniferous; ligules short, truncate.

Culms 1–9 in. Leaves narrow, setaceous. Panicle $\frac{1}{2}$–2 in., few-flowered. Spikelets $\frac{1}{8}$–$\frac{1}{6}$ in. Flowering glumes smooth, callus and lower part of keel and margins with crisped hairs .. .. 12. *P. pusilla.*

Culms 4–6 in. Leaves soft and flaccid. Panicle 2–2$\frac{1}{2}$ in. Spikelets $\frac{1}{5}$–$\frac{1}{4}$ in. Flowering glumes ovate, glabrous or with few crisped hairs on the callus .. .. .. 13. *P. aucklandica.*

Culms 6–15 in. Leaves usually shorter than the culms, flaccid. Panicle broad, lax, few-flowered. Spikelets $\frac{1}{3}$ in. long, 4–8-flowered .. .. 14. *P. dipsacea.*

Culms 12–18 in. Leaves much shorter than the culms, rigid, erect, obtuse. Panicle broad, spreading. Spikelets $\frac{1}{4}$ in. long, 5–6-flowered .. .. 15. *P. Cheesemanii.*

Culms 12–20 in. Leaves shorter than the culms, rigid, acute. Panicle broad, lax. Spikelets $\frac{1}{4}$–$\frac{1}{3}$ in. long, 2–3-flowered .. .. 16. *P. Cockayniana.*

††† Rhizome creeping, stoloniferous; ligules a transverse band of short dense hairs.

Culms 12–24 in. Leaves shorter than the culms, rigid, erect. Panicle 1$\frac{1}{2}$–3 in., dense. Spikelets $\frac{1}{4}$–$\frac{1}{3}$ in. Flowering glumes 4–5-nerved .. .. .. 17. *P. chathamica.*

Poa antipoda Petrie in Trans. Ns. 2: 1909: 478
cf. P. trivialis

** Culms tufted, strict, erect, smooth and polished. Leaves terete or nearly so, erect, rigid, acute or pungent-pointed.

† Ligules almost obsolete.

Culms 1–3 ft., forming dense tussocks. Flowering glumes prominently 5-nerved; callus and base of keel with a tuft of long crisped hairs .. .. 18. *P. caespitosa.*

†† Ligules long, hyaline, sheathing (except in var. *breviligulata* of *P. Colensoi*).

Culms 2–15 in., longer than the leaves. Panicle $\frac{1}{2}$–3 in. Flowering glumes faintly 5-nerved, smooth or nearly so, callus with a tuft of crisped hairs .. .. .. 19. *P. Colensoi.*

Culms 2–6 in. Leaves imbricated, very short and rigid, with acicular points. Panicle $\frac{1}{2}$–1 in., few-flowered. Flowering glumes villous with short silky hairs below the middle, minutely rough above .. .. .. 20. *P. acicularifolia.*

*** Culms $\frac{1}{2}$–1 in., densely tufted and compacted, forming patches 2–6 in. across. Leaves $\frac{1}{6}$–$\frac{1}{2}$ in. long. Panicle reduced to 1–2 spikelets.. 21. *P. pygmaea.*

C. Two outer glumes reaching more than half-way up the flowering glumes immediately above them. Flowering glumes broad, obtuse. Anthers small, often minute, $\frac{1}{25}$–$\frac{1}{15}$ in. long, oblong.

Culms 6–18 in., stout or slender, leafy throughout. Panicle 2–6 in., many-flowered. Spikelets $\frac{1}{6}$–$\frac{1}{3}$ in., green or purplish-green. Flowering glumes prominently 5-nerved, glabrous or rarely with a tuft of hairs on the callus .. 22. *P. Kirkii.*

Culms 3–12 in., slender and delicate, leafy at the base. Panicle 1–3 in., few-flowered. Spikelets $\frac{1}{10}$–$\frac{1}{8}$ in. long, silvery-brown. Flowering glumes faintly 5-nerved, silky with short white hairs .. .. 23. *P. Lindsayi.*

Culms 2–4 in., leafy throughout. Panicle lax, few-flowered. Spikelets 3–6, turgid, $\frac{1}{8}$–$\frac{1}{6}$ in. long, purplish-brown. Flowering glumes glabrous .. .. 24. *P. incrassata.*

Culms 1–5 in., leafy throughout. Panicle contracted, few-flowered. Spikelets compressed, $\frac{1}{10}$–$\frac{1}{8}$ in., green tinged with purplish-red. Flowering glumes quite glabrous, margins white and membranous .. .. .. 25. *P. exigua.*

Culms 1–3 in., leafy at the base. Panicle contracted into an oblong head $\frac{1}{4}$–$\frac{1}{3}$ in. long. Spikelets 4–12, $\frac{1}{6}$ in. long, pale glaucous-green. Flowering glumes silky with short crisped hairs .. .. 26. *P. maniototo.*

Culms 2–8 in., rigid. Leaves rough with minute asperities. Panicle $\frac{3}{4}$–2 in. long, dense and spiciform, many-flowered. Spikelets $\frac{1}{8}$ in. Flowering glumes quite glabrous, margins white and membranous .. .. .. 27. *P. sclerophylla.*

D. Two outer glumes not reaching half-way up the flowering glumes immediately above them. Flowering glumes broadly oblong or ovate-oblong, obtuse or acute. Anthers minute, $\frac{1}{50}$ in.

Culms 4–15 in., slender, leafy, flaccid. Spikelets $\frac{1}{10}$–$\frac{1}{8}$ in. Outer glumes minute, often unequal .. .. .. 28. *P. imbecilla.*

1. **P. foliosa** *Hook. f. Handb. N.Z. Fl.* (1864) 338 (*excl. var.* b).—Often forming large tussocks. Culms densely tufted, 1–4 ft. high, $\frac{1}{3}$–$\frac{2}{3}$ in. diam. at the base, stout, erect, leafy, compressed below. Leaves very numerous, subdistichous, usually exceeding the culms, 1–4 ft. long, $\frac{1}{3}$–$\frac{3}{4}$ in. broad, gradually narrowed into acuminate points, flat, coriaceous, glabrous, minutely scabrid above, somewhat glaucous beneath; sheaths rather lax, broad, compressed, striate, glabrous; ligules short, membranous, entire or dentate. Panicle large, linear-oblong, dense, contracted, inclined or nodding, 3–10 in. long, 1–3 in. broad; rhachis stout, grooved, glabrous;

branches suberect, much divided, slender, glabrous, multi-spiculate. Spikelets shortly pedicelled, much compressed, rather large, $\frac{1}{4}$–$\frac{1}{3}$ in. long, 3–5-flowered. Two outer glumes slightly unequal, keeled, acuminate; the lower subulate-lanceolate, 1-nerved; the upper broader and larger, about $\frac{2}{3}$ the length of the whole spikelet, lanceolate, 3-nerved. Flowering glumes ovate-lanceolate, acuminate, incurved at the tip, prominently 5-nerved; callus, together with the back and margins for $\frac{1}{2}$ their length, clothed with crisped silky hairs; upper portion of the glume scabrid. Palea $\frac{1}{3}$ shorter than the glume, linear-oblong, bifid at the tip.—*Buch. N.Z. Grassses* (1880) t. 42; *Cheesem. Man. N.Z. Fl.* (1906) 900. Festuca foliosa *Hook. f. Fl. Antarct.* i (1844) 99, t. 55.

STEWART ISLAND: Herekopere Island and headlands near the South Cape, *T. Kirk!* Codfish Island, Breakfast Island, and Long Island, *Poppelwell!* THE SNARES AND SOLANDERS: *T. Kirk! Chapman! Cockayne!* AUCKLAND AND CAMPBELL ISLANDS: *Hooker, Buchanan! T. Kirk! F. R. Chapman! B. C. Aston!* ANTIPODES ISLAND: *T. Kirk!* MACQUARIE ISLAND: *Fraser, Professor Scott, A. Hamilton! H. Hamilton!*

(Petrie) Trans. 73:236.

Var. **Tennantiana** *Cheesem.*—Smaller in all its parts. Culms densely tufted, 1–2 ft. high, $\frac{1}{3}$–$\frac{1}{2}$ in. diam. at the base. Panicle smaller, 3–6 in. long. Spikelets $\frac{1}{5}$ in. long, 2–4-flowered.—P. Tennantiana *Petrie in Subantarct. Is. N.Z.* ii (1909) 476. Barely differs from *P. foliosa* except in the reduced size and fewer-flowered spikelets.

Easily distinguished from all other New Zealand species by the great size, very broad flat leaves, and large dense panicle. It is closely allied to the Kerguelen Island *P. Cookii* Hook. f., and to the well-known tussock-grass of the Falkland Islands and Fuegia, *P. flabellata* Hook. f. (*Dactylis caespitosa* Forst.). The flowers seem to be partly if not altogether unisexual, most of the specimens that I have seen being females with the anthers much reduced in size.

2. **P. Hamiltoni** *T. Kirk in Trans. N.Z. Inst.* xxvii (1894) 353.—Perennial, densely tufted, 5–20 in. high. Culms shorter than the leaves, erect, stout, sometimes $\frac{1}{3}$ in. diam. below, compressed, leafy almost up to the base of the panicle. Leaves numerous, subdistichous, lower much reduced in size and sheathing the culm, gradually passing into the upper, which usually far overtop the paniele, $\frac{1}{6}$–$\frac{1}{4}$ in. diam. at the base, from thence gradually tapering into a long acuminate point, flat, coriaceous, many-striate, smooth and glabrous, not scabrid; ligules large, broad, ovate, membranous, deeply and irregularly laciniate; sheaths long, compressed, thin and rather membranous, regularly striate. Panicle linear-oblong or linear-obovate; sometimes almost clavate, dense and contracted, rarely sublobed towards the base, 2–3$\frac{1}{2}$ in. long, $\frac{1}{3}$–$\frac{2}{3}$ in. broad, usually strict and erect; branches close-set, rarely more than 1$\frac{1}{2}$ in. long. Spikelets rather large, compressed, $\frac{2}{3}$–$\frac{3}{5}$ in. long, 2–4-flowered; lower flower almost sessile, upper pedicelled. Outer glumes unequal, but not remarkably so, ovate-lanceolate, acuminate, 3-nerved; flowering glumes lanceolate or ovate-lanceolate, acuminate or almost awned, incurved at the tip, keeled, 5-nerved, scabrid on the keel and nerves, shortly hairy on the sides towards the base, but not webbed with cottony hairs. Palea linear-oblong, bifid at the tip, ciliate on the margins and keel, about $\frac{1}{3}$ shorter than the glume. Lodicules broad-ovate, acute. Anthers large, narrow-linear, about $\frac{1}{10}$ in. long.—*Cheesem. Man. N.Z. Fl.* (1906) 1156; *Petrie in Subantarct. Is. N.Z.* ii (1909) 477; *Cheesem. in Vascl. Flora Macquarie Is.* (1919) 36.

MACQUARIE ISLAND: On rocks near the sea, usually fringing the *Poa foliosa* belt, *A. Hamilton, H. Hamilton!*

One of the few endemic plants of the island, and a very distinct species. It is best characterized by the short strict culms, the deeply laciniate ligule, and the short and narrow much contracted panicle. Kirk states that its nearest allies are *P. foliosa* and *P. anceps*. It doubtless belongs to the *P. foliosa* group; but it has little affinity with *P. anceps*, from which it differs in the mode of growth, in the leaves, and particularly in the deeply laciniate ligule, which is widely different from the truncate rim-like ligule of *P. anceps*, also in the acuminate and inourved flowering glumes and the large anthers. The particulars given above have been mainly drawn from my "Vascular Flora of Macquarie Island" (Australian Antarctic Expedition, vol. vii, part 3).

3. **P. novae-zealandiae** *Hack. in Trans. N.Z. Inst.* xxxv (1903) 381.—Perennial, tufted, innovation-shoots intravaginal or mixed. Culms erect, 3–18 in. high, slender, glabrous, 3-noded, upper node about the middle of the culm. Leaves usually much shorter than the culms, 2–10 in. long, $\frac{1}{12}$–$\frac{1}{4}$ in. broad, linear, suddenly acuminate at the tip, flat or those of the innovation-shoots complicate, erect, quite glabrous, finely striate; sheaths lax, compressed; ligules ovate, acuminate, often dentate. Panicle broadly ovate to ovate-oblong or linear-oblong, dense, nodding or more rarely erect, 1–4 in. long; rhachis smooth, terete; branches binate or ternate, once or twice divided, smooth, capillary. Spikelets pale-green or whitish-green, much compressed, elliptic-oblong, $\frac{1}{4}$–$\frac{1}{3}$ in. long, 5–6-flowered. Two outer glumes slightly unequal, acuminate, glabrous; lower subulate-lanceolate, 1-nerved; upper longer and broader, about $\frac{1}{2}$ as long as the whole spikelet or rather more, lanceolate, 3-nerved. Flowering glumes lanceolate, acuminate, often incurved at the tip, usually 5-nerved, but the intermediate nerve on each side faint and sometimes obsolete, callus with a tuft of crisped woolly hairs more than $\frac{1}{2}$ as long as the glume, remainder of the glume glabrous, smooth. Palea $\frac{1}{3}$ shorter than the glume, linear-oblong, bidentate, pubescent on the keels.—*Cheesem. Man. N.Z. Fl.* (1906) 901. P. foliosa *var.* b *Hook. f. Handb. N.Z. Fl.* (1864) 338; *Buch. N.Z. Grasses* (1880) t. 43. Festuca foliosa *Hook. f. Fl. Nov. Zel.* i (1853) 308 (*not of Fl. Antarct.*).

Var. **subvestita** *Hack. l.c.*—Flowering glumes rather longer, clothed with crisp hairs in the lower $\frac{1}{3}$, exterior lateral nerves more prominent. Spikelets often tinged with violet.

Var. **Wallii** *Petrie MS.*—Stout, depauperated, 2–4 in. high. Panicle short, broad, dense, sunk among the leaves. — Mount Miromiro, Amuri, *A. Wall!* Raglan Mountains, Wairau Valley, 5000 ft., *T. F. C.* Distinguished by Hackel as "*forma humilior.*"

North Island: Mount Hikurangi, *Petrie!* Tongariro, Ngauruhoe, and Ruapehu, *T. F. C., Cockayne!* Mount Egmont, *Buchanan! T. F. C.;* Tararua Mountains, *Buchanan! W. Townson!* South Island, Stewart Island: Abundant in damp alpine and subalpine localities. 2500–6500 ft.

Separated without any difficulty from *P. foliosa*, with which it was placed by Hooker, by the different habit, much smaller size, shorter narrower and smoother leaves, smaller and proportionately broader panicle, and less prominently nerved flowering glumes, which are less silky at the base, and almost smooth above.

4. **P. litorosa** *Cheesem. Man. N.Z. Fl.* (1906) 1156.—A tall densely tufted species, often forming tussocks 2–4 ft. high. Culms many, branched at the base, and there closely compacted together, leafy, quite glabrous, 2–3-noded, striate. Leaves much longer than the culms, narrow linear-filiform, gradually drawn out into long acuminate points, strongly involute throughout, coriaceous, glabrous, striate, erect at the base, curving

outwards above; sheaths very long, smooth, shining; ligules oblong, membranous. Panicle 3–5 in. long, erect or inclined, closely branched or more or less open; branchlets few or many, finely scaberulous. Spikelets pedicelled, compressed, ovate-oblong to ovate-lanceolate, $\frac{1}{4}$–$\frac{1}{3}$ in. long, 4–6-flowered. Empty glumes slightly unequal, barely $\frac{1}{2}$ the length of the spikelet, lanceolate, acute, 3-nerved, the central nerve alone excurrent. Flowering glumes ovate-lanceolate, acute or subacute, prominently 5-nerved, callus, margins, and lower part of the keel with long crisped hairs, becoming shorter towards the middle of the glume, the upper part of the glume minutely scaberulous. Palea $\frac{1}{4}$ shorter than the glume, linear-oblong, bidentate, scabrid on the keels.—Poa Poppelwellii *Petrie in Trans. N.Z. Inst.* xlvi (1914) 38. Festuca scoparia *Hook. f. Fl. Antarct.* i (1844) 98 (*not* Poa scoparia *Kunth.*). Trans 45 : 264

Auckland and Campbell Islands: *Hooker, T. Kirk, Cockayne! B. C. Aston!* and others. Herekopere Island: *H. Guthrie-Smith!*

This, with *Poa foliosa* and *Danthonia antarctica*, constitute the chief "tussock-grasses" of the Subantarctic islands. I am unable to separate from it Mr. Petrie's *P. Poppelwellii*, based on cultivated specimens originally from Herekopere Island.

5. **P. Astoni** *Petrie in Trans. N.Z. Inst.* xxxviii (1906) 423.—Culms densely tufted, 12–15 in. high. Leaves equalling or exceeding the culms, very narrow, linear-filiform, gradually narrowed into an almost pungent point, closely involute, striate, glabrous; sheaths long, compressed, striate; ligules broadly triangular, acute. Panicle 2–2½ in. long, ovate or ovate-oblong, rather dense; branches short, simple or divided. Spikelets compressed, ovate-oblong, $\frac{1}{4}$ in. long, 5–6-flowered. Two outer glumes about $\frac{1}{2}$ as long as the spikelet, subequal, broadly lanceolate, acuminate, glabrous, 3-nerved. Flowering glumes ovate-lanceolate, acuminate, keeled, strongly 5-nerved, usually with a tuft of crisped hairs on the callus and lower part of the keel, but frequently without. Palea linear-oblong, bidentate, ciliate-scabrid on the keels.—*Cheesem. Man. N.Z. Fl.* (1906) 1165. Festuca scoparia *Hook. f. Handb. N.Z. Fl.* (1864) 341 (*in part, but not of Fl. Antarct.* i, 98); *Buch. N.Z. Grasses* (1880) t. 55A.

South Island: Coastal Cliffs at Okarito, *Cockayne.* Rocky cliffs on the coast-line of Otago, not uncommon. Stewart Island (and small islands in the vicinity): Common along the coast. The Solanders and Snares: *Cockayne.* Auckland Island: *B. C. Aston.*

This is closely allied to *P. litorosa*, from which it is best distinguished by its smaller size and more slender habit, and the usually smaller spikelets. Many specimens are quite intermediate in their characters.

6. **P. oraria** *Petrie in Trans. N.Z. Inst.* xlii (1910) 196.—Culms numerous, tufted, sparingly leafy, slender, strict, erect, smooth and polished, pale yellowish-green, 12–18 in. high, perfectly glabrous, 2- or rarely 3-noded, the lowest node distant from the base. Leaves longer or shorter than the culms, erect, filiform, strongly involute so that the leaf is almost terete, somewhat rigid and almost pungent-pointed, perfectly smooth and glabrous, striate; sheaths long, broad, membranous; ligule rather long, oblong, obtuse. Panicle 2–4 in. long, very narrow, linear, strict, erect; branches few, suberect, short, simple or sparingly divided; pedicels slender. Spikelets $\frac{1}{4}$–$\frac{1}{3}$ in. long, 4–5-flowered. Two outer glumes subequal, about $\frac{1}{3}$ shorter than the spikelet, linear-lanceolate, acuminate, 3-nerved. Flowering glumes narrow-lanceolate, finely acuminate, membranous, 5-nerved, callus and lower part of keel sparingly pilose with floccose hairs, the keel and nerves

6. placed by Cotton as var. γ P. astoni Trans 73 : 236.

Poa wallii Petrie Trans 54:1923:571 Top of Craigieburn Ra. A.W.

above more or less scabrid with stiff silky hairs. Palea shorter than the flowering glumes, 2-nerved, the nerves slightly scaberulous.

South Island: Wet places at the head of Deep Cove, and others of the West Coast Sounds of Otago, *B. C. Aston!*

7. **P. ramosissima** *Hook. f. Fl. Antarct.* i (1844) 101.—Culms very numerous, densely packed, forming large prostrate masses on steep banks, or pendent from moist cliffs, 12–18 in. long, naked at the base or clothed with the remains of the old leaves, many-noded, much and fasciculately branched above. Branches many times divided, slender, leafy, flaccid, 2–9 in. long. Leaves much longer than the culms, 3–6 in. long, $\frac{1}{12}$–$\frac{1}{5}$ in. broad, narrow linear-subulate, acute, flat, flaccid, quite smooth and glabrous, obsoletely striate; sheaths long, slender, smooth, striate, fissured to the base; ligules oblong, membranous, lacerate. Panicle dense and contracted, linear-oblong, erect, 1–2 in. long, $\frac{1}{3}$–$\frac{1}{2}$ in. broad; rhachis slender, smooth; branches short, erect, $\frac{1}{4}$ in. long, quite smooth and glabrous, bearing 3–4 shortly pedicelled spikelets. Spikelets $\frac{1}{5}$–$\frac{1}{4}$ in. long, ovate-lanceolate, acute, compressed, 3–5-flowered. Two empty glumes subequal, rather more than $\frac{1}{2}$ as long as the spikelet, lanceolate, acuminate, often incurved at the tips, glabrous; the lower 1-nerved, the upper broader, 3-nerved. Flowering glumes ovate-lanceolate, acuminate, keeled, 5-nerved, but the lateral nerves obscure, smooth and glabrous, callus at the base glabrous or with a tuft of crisped hairs. Palea linear-oblong, shorter than the flowering glume. Anthers long, linear.—*Hook. f. Handb. N.Z. Fl.* (1864) 338; *Cheesem. Man. N.Z. Fl.* (1906) 902; *Cockayne Veg. N.Z.* (1921) t. 88.

Auckland and Campbell Islands: Abundant near the sea, *Hooker! Cockayne! B. C. Aston!* and others.

Sir J. D. Hooker remarks that "this is a very abundant grass in both groups of islands, and of a most singular habit of growth. The culms are invariably prostrate and quite simple for a foot or two, when they suddenly ascend and divide into many short branches, each bearing a panicle of flowers. It forms a copious soft green herbage, especially on the banks near the sea, always throwing its long culms over the edges of the cliffs, which are thus fringed with a delicate festoon of green."

8. **P. Guthrie-Smithiana** *Petrie in Trans. N.Z. Inst.* xlv (1913) 275.—Culms densely tufted, creeping or prostrate at the base, many-noded, emitting from the nodes numerous intravaginal excessively slender erect or ascending branches 5–10 in. long. Leaves shorter than the culms, very narrow-linear, almost filiform, complicate, firm, erect, smooth and glabrous, obscurely striate, acute; sheaths long, much broader than the blade, fissured to the base, thin, striate; ligule thin, membranous, acute. Panicle 2–4 in. long, narrow-linear, dense, strict and erect; branches short, erect, in whorls of 3–5, minutely scaberulous. Spikelets shortly pedicelled, $\frac{1}{5}$–$\frac{1}{4}$ in. long, 3–5-flowered. Two outer glumes unequal, barely $\frac{1}{3}$ the length of the spikelet, lanceolate, acute, glabrous; lower 1-nerved, upper faintly 3-nerved. Flowering glumes oblong-lanceolate, acute or subacute, keeled, smooth and glabrous, 3-nerved, the central nerve often excurrent, margins thin and scarious, callus and base of keel with a few long crisped hairs. Palea nearly as long as the glume, linear-oblong, ciliate on the keels. Zotov. Trans 73:236 places this as P. colensoi var. Guthrie-Smithiana

Herekopere Island (off Stewart Island): *H. Guthrie-Smith!*

The above description has been drawn up from cultivated specimens grown in Mr. Petrie's garden, and may need revision when wild specimens are available. The species is remarkable for its slender habit, filiform leaves, and extremely narrow panicle.

Poa affinis R.Br. Pr. N.Z. i 207 } not taken up by Cheesem.
= uniflora Buch. t. xlix B. }

9. **P. polyphylla** *Hack. in Trans. N.Z. Inst.* xxxv (1903) 383.—Tufted; innovation-shoots extravaginal. Culms erect or decumbent at the base and then ascending, often much branched, many-noded, compressed, glabrous, wiry, 6–18 in. high. Leaves numerous, sheathing the culm, distichously spreading, 4–10 in. long, about $\frac{1}{10}$ in. broad, flat or complicate, lower portion smooth, upper part scabrid on the margins and keel; sheaths overlapping, tight, compressed, grooved; ligules reduced to a narrow truncate rim. Panicle 1–3 in. long by $\frac{1}{2}$–1 in. broad, oblong, dense, contracted; branches usually binate, short, erect, divided, spiculate almost to the base, more or less scabrid. Spikelets oblong, compressed, 4–5-flowered, $\frac{1}{5}$–$\frac{1}{4}$ in. long. Two outer glumes unequal, lanceolate, acuminate, 1-nerved, sharply scabrid along the keel, the upper the longer, rather more than $\frac{1}{2}$ the length of the spikelet. Flowering glumes lanceolate, sharply acuminate, almost mucronate, keeled, prominently 5-nerved, minutely scabrid on the surface and nerves and sharply scabrid along the keel, callus and lower part of keel with long crisped woolly hairs. Palea slightly shorter than the glume, linear-oblong, scabrid on the keels. Anthers long.—*Cheesem. Man. N.Z. Fl.* (1906) 903; *Ill. N.Z. Fl.* ii (1914) t. 229. Placed by Zotov (13: 236) a var. of anceps.

Kermadec Islands: Abundant on Sunday and Macaulay Islands, chiefly near the sea, *T. F. C., Miss Shakespear! W. R. B. Oliver!*

Distinguished by the branching habit, distichously spreading leaves, short contracted panicle, and narrow acuminate flowering glumes, which are sharply scabrid on the keel, and scaberulous on the surfaces and veins.

10. **P. anceps** *Forst. f. Prodr.* (1786) n. 43.—Perennial, very variable; innovation-shoots extravaginal. Culms tufted, often branched at the base, stout, compressed, glabrous, leafy, 10–36 in. high or even more. Leaves longer or shorter than the culms, subdistichous, 9–18 in. long, $\frac{1}{8}$–$\frac{1}{4}$ in. broad, acute or acuminate, rather coriaceous, flat or concave, smooth on both surfaces or the margins slightly scabrid near the apex; sheaths compressed, grooved; ligules a short truncate rim. Panicle very variable, 4–12 in. long, 1–5 in. broad, lanceolate to oblong or ovate, effuse or contracted, rather dense or open, inclined or erect; rhachis smooth or scaberulous; branches short or long, suberect or spreading, 2 or 3 or more from one node, once or twice divided; branchlets capillary, scaberulous. Spikelets ovate-oblong, compressed, $\frac{1}{4}$–$\frac{1}{3}$ in. long, 4–6-flowered. Two outer glumes unequal, not $\frac{1}{2}$ the length of the spikelet, but reaching $\frac{3}{4}$-way up the flowering glume above them, lanceolate, acuminate, 3-nerved, scabrid on the keel and sides or almost glabrous. Flowering glumes oblong to oblong-ovate, obtuse or subacute, keeled, prominently 5-nerved, minutely scaberulous on the surface and nerves or almost smooth, keel usually scabrid, callus and lower part of keel with a few crisped hairs or almost glabrous. Palea almost as long as the flowering glume, linear-oblong, minutely ciliate-scabrid on the keels. Anthers long.—*Hook. f. Fl. Nov. Zel.* i (1853) 306; *Handb. N.Z. Fl.* (1864) 339; *Buch. N.Z. Grasses* (1880) t. 44; *Cheesem. Man. N.Z. Fl.* (1906) 904. P. australis *A. Rich. Fl. Nouv. Zel.* (1832) 141; *A. Cunn. Precur.* (1836) n. 262; *Raoul Choix* (1846) 39 (*not of R. Br.*).

1906

Var. **condensata** *Cheesem.*—Culms 4–18 in. high, often overtopped by the leaves. Panicle shorter and much more compact, dense-flowered. Spikelets rather smaller, 2–4-flowered. Glumes smoother, hardly scaberulous.

Var. **gracilis** *Cheesem.*—Culms slender, 4–18 in. high. Leaves narrow, often involute. Panicle lax; branches few, 2–3 from each node or solitary; spikelets fewer, towards the tips of the branchlets, smaller, 2–5-flowered. Glumes smoother. This appears to connect the type with *P. seticulmis.*

North and South Islands: The typical form throughout the whole of the North Island, ranging from sea-level to 3500 ft., apparently rare and local in the South Island, but recorded from Marlborough and Nelson, and extending along the West Coast to the south of Westport. Var. *condensata* not uncommon as far as Canterbury, but apparently rare to the south of Marlborough; var. *gracilis* has somewhat the same range.

What I consider to be the typical state of this variable plant includes the two varities *elata* and *foliosa* of the Handbook, and can be distinguished by the tall stout culms often branching at the base, broad and flat subdistichous smooth leaves, large usually lax panicle, and numerous rather large spikelets, with subacute flowering glumes prominently nerved and usually more or less finely scaberulous. But it runs on all sides into numerous varieties exceedingly difficult to define, if, indeed, they are capable of exact circumscription.

11. **P. seticulmis** *Petrie in Trans. N.Z. Inst.* xxxiv (1902) 391.—Culms tufted, branched at the base, very slender, erect, smooth and glabrous, 4–12 in. high. Leaves shorter or longer than the culms, very narrow, usually involute and filiform, rarely slightly broader and flat, erect, smooth, striate; sheaths pale, membranous, grooved; ligules reduced to a narrow membranous ciliolate rim. Panicle 1½–3 in. long, ovate to oblong, lax, few-flowered; rhachis capillary, scaberulous above; branches few, in distant pairs or the upper solitary, spreading or suberect, sparingly branched, capillary, scaberulous. Spikelets few at the tips of the branchlets, oblong, ⅙–⅕ in. long, 3–5-flowered. Two outer glumes slightly unequal, about ½ the length of the spikelet or less, lanceolate, acute, 3-nerved, smooth or nearly so. Flowering glumes oblong-ovate, obtuse or subacute, 5-nerved, smooth or minutely scaberulous on the keel, a few crisped hairs on the callus and lower part of the back. Palea almost as long as the glume, ciliate on the keels. Anthers long, linear.—*Cheesem. Man. N.Z. Fl.* (1906) 904.

North and South Islands, Stewart Island: Not uncommon in dry places throughout. Sea-level to 2500 ft.

What may be taken as the typical form of this species is abundant on sandy soil near the sea in the northern part of the North Island, and from its very slender filiform culms and leaves and lax few-flowered panicle presents a very distinct appearance. But, as Mr. Petrie remarks, there is a widely spread inland state that cannot be separated from it by any characters of importance, but which gradually varies into small and slender states of *P. anceps*, the var. *gracilis* of that plant forming a direct connection between the two species.

12. **P. pusilla** *Berggr. in Minneskr. Fisiog. Sallsk. Lund.* (1877) 31, t. 7, f. 35–40.—Rhizome long, creeping and rooting. Culms variable in size, often much dwarfed, 1–9 in. high, erect or ascending, slender, smooth and glabrous, striate. Leaves much shorter than the culms, subdistichous, narrow, involute, setaceous; sheaths pale, compressed, grooved; ligules extremely short, reduced to a mere rim. Panicle variable in size, ½–2 in. long, broadly ovate, lax, few-flowered; branches few, slender, capillary, spreading, in depauperated states reduced to 2 or 3, each with a single spikelet, in large forms 4–8, with 1–4 spikelets at the tip. Spikelets pale-green, ovate, compressed, ⅛–⅙ in. long, 2–5-flowered. Two outer glumes subequal, about ½ as long as the spikelet, oblong-ovate to oblong-lanceolate, acute, 3-nerved, smooth or scabrid on the keel above. Flowering

glumes oblong-ovate, obtuse, 5-nerved, smooth or rarely minutely scaberulous on the keel, callus and lower part of keel and margins with long crisped woolly hairs. Palea about $\frac{3}{4}$ the length of the glume, silky on the keels. Anthers long, linear.—*Cheesem. Man. N.Z. Fl.* (1906) 905. P. anceps *var.* minima *Buch. N.Z. Grasses* (1880) t. 46F.

South Island: Wet places in mountain districts, from the Wairau Valley, Nelson, to the south of Otago. Stewart Island: *T. Kirk! Cockayne.* Sea-level to 5000 ft.

I am greatly puzzled with this species. Forms very closely resembling Berggren's plate and description are not uncommon in subalpine localities in the South Island, but they appear to pass insensibly into a larger lowland state, with a more developed panicle and larger spikelets. This in its turn approaches so near to *P. seticulmis* that it is difficult to draw a strict line of demarcation between the two plants.

13. **P. Aucklandica** *Petrie in Subantarct. Is. N.Z.* ii (1909) 478.—Culms slender, tufted, branched from the base, 4–6 in. high. Leaves equalling the culms, soft and flaccid, narrow-linear, setaceous above, acute; sheaths long, much broader than the blades, fissured to the base, strongly grooved, quite glabrous; ligules oblong, membranous, lacerate. Panicle short, 2–2½ in. long, broadly ovate, lax, few-flowered; branches few, very slender, scaberulous. Spikelets long-pedicelled, large for the size of the plant, $\frac{1}{5}$–$\frac{1}{4}$ in. long, broadly ovate, compressed, 4–5-flowered. Two outer glumes nearly equal, about $\frac{1}{2}$ the length of the spikelet, ovate-lanceolate, acute, 3-nerved. Flowering glumes ovate, acute, 5-nerved, the central nerve often slightly excurrent, glabrous, or with a few crisped hairs on the callus. Palea shorter than the flowering glume, linear-oblong; keels ciliate.

Auckland Islands: Hills above Carnley Harbour, *B. C. Aston!* Campbell Island: *R. M. Laing.*

The only specimens I have seen are few and imperfect and quite insufficient for a proper understanding of the species. Its nearest ally appears to be *P. dipsacea.*

14. **P. dipsacea** *Petrie in Trans. N.Z. Inst.* xxvi (1894) 271.—Culms erect from an often long and branched creeping and rooting base, stout or slender, smooth, leafy, 6–18 in. high. Leaves usually shorter than the culms, narrow, involute or complicate, quite smooth and glabrous, deeply striate; sheaths rather loose, pale, deeply grooved; ligules short, broad, submembranous. Panicle 2–5 in. long, broadly ovate, lax, few-flowered; rhachis smooth; branches usually in distant pairs, simple or forked, smooth, capillary, bearing few large spikelets towards the tips. Spikelets long-pedicelled, elliptic-ovate, compressed, greenish-brown, about $\frac{1}{3}$ in. long, 4–8-flowered. Two outer glumes unequal, almost as long as the flowering glumes immediately above them, lanceolate, acute, membranous, smooth or finely scabrid on the upper part of the keel. Flowering glumes ovate, obtuse or subacute, rather membranous, prominently 5-nerved, callus and lower part of the keel and margins with long silky hairs, upper part of keel sharply scabrid, surface and nerves in the upper half minutely scaberulous. Palea shorter than the glume, keels ciliate. Anthers long, linear.—*Cheesem. Man. N.Z. Fl.* (1906) 906; *Ill. N.Z. Fl.* ii (1914) t. 230.

South Island: Nelson—Raglan Range, *T. F. C.* Canterbury—Wet places near the sources of the Broken River, *Petrie! T. F. C.*; Craigieburn Mountains, *Cockayne!* Mount Peel, *H. H. Allan!* 3000–5000 ft.

This seems to be a distinct species, recognized without much difficulty by the long decumbent bases of the culms, very lax few-flowered panicle, and large spikelets clustered at the tips of the branchlets. Depauperated states approach *P. pusilla,* but are easily distinguished by the larger spikelets and more distinctly nerved scaberulous flowering glumes.

15. **P. Cheesemanii** *Hack. in Trans. N.Z. Inst.* xxxv (1903) 383.—Perennial, hardly tufted; rhizome with creeping stolons furnished with leafless scales. Culms erect or decumbent at the base, slender, smooth, terete, 3-noded, the upper node about half-way up the culm, 12–18 in. high. Leaves much shorter than the culms, 2–6 in. long, about $\frac{1}{12}$ in. broad, rigid, erect, obtuse at the tip, more or less complicate when dry; sheaths shorter than the internodes, subcompressed, keeled in the upper part, glabrous; ligules short, truncate. Panicle ovate, lax, spreading, 2–5 in. long; rhachis smooth, more or less flexuose above; lower branches ternate, upper binate or solitary, slender, almost capillary, lower $\frac{2}{3}$ undivided and smooth, towards the tip bearing a few unispiculate branchlets. Spikelets elliptic, often tinged with red, rather more than $\frac{1}{4}$ in. long, 5–6-flowered. Two outer glumes unequal, $\frac{3}{4}$ the length of the flowering glumes above them or even more, oblong-lanceolate, acute, 3-nerved, quite smooth. Flowering glumes oblong-ovate, subacute, prominently 5-nerved, callus clothed with long crisped woolly hairs $\frac{1}{2}$ the length of the glume, keel and nerves near the base sparingly villous, remainder of the glume smooth and glabrous. Palea almost as long as the glume, linear-oblong, scabrid on the keels. Anthers linear, about $\frac{1}{12}$ in. long.—*Cheesem. Man. N.Z. Fl.* (1906) 906; *Ill. N.Z. Fl.* ii (1914) t. 231.

South Island: Nelson—Lake Tennyson, *T. F. C.*; near Westport, *W. Townson!*

Professor Hackel remarks of this species that it is allied to *P. anceps*, but differs markedly in the stoloniferous rhizome, the rhizome of *P. anceps* being invariably tufted and without stolons. The spikelets are also broader, the two outer glumes longer in proportion and smoother, and the flowering glumes much more hairy at the base and smoother above. *P. dipsacea* differs in the more flaccid habit, larger spikelets, and in the flowering glumes being scabrous above.

16. **P. Cockayniana** *Petrie in Trans. N.Z. Inst.* xlv (1913) 274.—Tufted, much branched at the base, and there clothed with leafless scales. Culms numerous, 12–20 in. high, erect, slender, smooth and glabrous, terete, 2–3-noded, the upper node rather more than half-way up the culm. Leaves shorter than the culms, about $\frac{1}{12}$ in. broad, rigid, erect, more or less complicate when dry, rarely flat, acute at the tip, smooth and glabrous when adult, finely pubescent when young, striate on both surfaces; sheaths long, membranous, grooved or striate; ligules short, broad, erose. Panicle ovate, lax, spreading, 4–6 in. long; rhachis slender, scaberulous; branches long, capillary, the lower 2-nate or rarely 3-nate, upper solitary. Spikelets few, distant, $\frac{1}{4}$–$\frac{1}{3}$ in. long, compressed, ovate, acute, 2–3-flowered. Two empty glumes slightly unequal, $\frac{4}{5}$ the length of the spikelet, oblong-lanceolate, acute, 3-nerved, quite smooth on the face, scabrid on the keel. Flowering glumes oblong, obtuse, membranous, erose at the tip, 5-nerved, margins thin and scarious, callus and lower part of the keel with long cobwebby hairs. Palea shorter than the glume, ciliate on the keels.

South Island: Banks of the Rolleston River, Westland, *Cockayne!* 3000–4000 ft.

Mr. Petrie considers this to be a near ally of *P. dipsacea*, but it is much more closely related to *P. Cheesemanii*, of which it has the habit and foliage, differing chiefly in the more open panicle, and fewer-flowered spikelets.

17. **P. Chathamica** *Petrie in Trans. N.Z. Inst.* xxxiv (1902) 394.—Rhizome long, wiry, creeping and rooting among *Sphagnum*, &c. Culms 1–2 ft. high, often decumbent and branched at the base, erect above,

rather rigid, smooth, leafy. Leaves usually shorter than the culms, narrow, $\frac{1}{12}$–$\frac{1}{8}$ in. broad, erect, rather coriaceous, tapering to a stiff acute point, flat or concave, smooth, striate ; sheaths compressed, lax, grooved ; ligules a transverse band of short stiff white hairs. Panicle 1½–3 in. long, linear-oblong to ovate-oblong, rather dense ; branches few, usually binate, short, slender, capillary, scabrid-ciliate. Spikelets ovate or oblong-ovate, compressed, pale-green or purplish, $\frac{1}{4}$–$\frac{1}{3}$ in. long, 4–5-flowered. Two outer glumes slightly unequal, about $\frac{1}{2}$ the length of the spikelet, oblong-lanceolate, acute, 3-nerved, scabrid on the keel. Flowering-glumes oblong-ovate, obtuse or subacute, prominently 5-nerved, minutely scaberulous on the surfaces and nerves, keel usually strongly scabrid, callus and lower part of keel and margins with sparse crisped woolly hairs. Palea about as long as the glume, bidentate, strongly ciliate on the keels. Anthers long, linear.—*Cheesem. Man. N.Z. Fl.* (1906) 907.

CHATHAM ISLANDS : Abundant in *Sphagnum* swamps, *F. A. D. Cox! Cockayne!*

Closely allied to *P. anceps*, but sufficiently distinct in the creeping rhizome, more coriaceous erect leaves, ligule composed of short stiff hairs, and short dense panicle with few branches and rather large spikelets.

18. **P. caespitosa** *Forst. f. Prodr.* (1786) n. 498.—Culms densely tufted, forming compact tussocks, pale yellowish-green, slender, erect, smooth and polished, 1–3 ft. high. Leaves longer or shorter than the culms, very narrow, often filiform, usually with the margins strongly involute so that the leaf is nearly terete, rarely flat, strict, wiry, erect, pungent, smooth and polished ; sheaths long, smooth and shining ; ligules almost obsolete, reduced to a narrow transverse rim. Panicle 2–9 in. long, broad or narrow, lax ; branches few, in distant whorls or clusters, or in small specimens binate or solitary, sparingly divided, spreading, capillary, scabrid. Spikelets pale-green, about $\frac{1}{4}$ in. long, 3–6-flowered. Two outer glumes unequal, about $\frac{3}{4}$ the length of the flowering glumes above them, ovate-lanceolate, acute, membranous, 3-nerved, smooth or scabrid on the keel. Flowering glumes oblong-lanceolate to oblong-ovate, subacute or obtuse, prominently 5-nerved, minutely scaberulous, callus and base of keel with a tuft of long crisped silky hairs. Palea rather shorter than the glume, minutely ciliate on the keels. Anthers linear, about $\frac{1}{10}$ in. long.—*A. Cunn. Precur.* (1836) n. 264 ; *Raoul Choix* (1846) 39 ; *Benth. Fl. Austral.* vii (1878) 651 ; *Cheesem. Man. N.Z. Fl.* (1906) 907. P. australis *var.* laevis *Hook. f. Handb. N.Z. Fl.* (1864) 339 ; *Buch. N.Z. Grasses* (1880) t. 47. P. laevis *var.* filifolia *Hook. f. Fl. Nov. Zel.* i (1853) 307.

Var. **leioclada** *Hack. in Cheesem. Man. N.Z. Fl.* (1906) 908. — Panicle-branches smooth. Spikelets larger, ⅓ in. long or more.

Var. **australis** *Benth. Fl. Austral.* vii (1878) 653.—Leaves rough and scabrous. Panicle very lax and spreading. Perhaps naturalized.

Var. **planifolia** *Petrie in Trans. N.Z. Inst.* xlvii (1915) 58.—Dark-green. Sheaths of the leaves long, scaberulous ; blades flat, keel prominent.

NORTH AND SOUTH ISLANDS, STEWART ISLAND : The typical state abundant from the Upper Thames and Waikato southwards. Var. *leioclada :* Mount Egmont, *Petrie !* near Westport, *W. Townson !* Var. *australis :* Marua, near Whangarei, *H. Hawkins !* near Auckland, *T. F. C.* Var. *planifolia :* Cultivated specimens grown from seed brought from Antipodes Island, *Petrie !* Sea-level to 4500 ft. "*Tussock-grass.*"

Also in Australia and Tasmania. The most abundant grass through wide districts in the South Island, also plentiful in the elevated central portions of the North Island. Unfortunately, it is not relished by stock, and is seldom eaten, save in the absence of better food.

19. **P. Colensoi** *Hook. f. Handb. N.Z. Fl.* (1864) 340.—Culms densely tufted, branched at the base, slender, erect, quite smooth, pale whitish-green, 2–14 in. high. Leaves shorter than the culms, very narrow, filiform, the margins so strongly involute that the leaf is almost terete, acute, erect or curved, rigid and wiry, quite smooth, polished; sheaths long, pale, rigid, grooved, the lower persistent long after the blades have fallen; ligules very large and long, sheathing, membranous, hyaline. Panicle ½–2 in. long, broadly ovate, lax, few-flowered; branches few, usually binate, slender, capillary, scabrid, bearing 1–3 spikelets at the tip. Spikelets pale-green, compressed, ⅕–¼ in. long, 3–6-flowered. Two outer glumes unequal, reaching about ⅔-way up the flowering glumes above them, oblong-lanceolate, acute, 3-nerved, the lateral nerves short and faint, smooth. Flowering glumes oblong-ovate, subacute, faintly 5-nerved, smooth or nearly so, keel and surfaces in the lower half very sparsely silky-pubescent or quite glabrous, with no long tuft of crisped hairs as in *P. caespitosa*. Palea slightly shorter than the glume. Anthers long, linear, about $\frac{1}{12}$ in. long.—*Buch. N.Z. Grasses* (1880) t. 48B; *Cheesem. Man. N.Z. Fl.* (1906) 908.

Var. **intermedia** *Cheesem. Man. N.Z. Fl.* (1906) 908.—Taller, with more of the tussocky habit of *P. caespitosa*, 9–18 in. high. Ligules as in the typical state. Panicle larger, 2–3 in. long. Spikelets more numerous, larger, ⅓ in. long, but flowering glumes as in the type.—P. intermedia *Buch. N.Z. Grasses* (1880) t. 48A.

Var. **breviligulata** *Petrie in Trans. N.Z. Inst.* xlvii (1915) 57.—Ligules very short or almost obsolete, not sheathing. Otherwise much as in the type.

North Island: Mountainous localities and dry elevated plains of the interior, from Moehau (Cape Colville) southwards, but rare and local to the north of Lake Taupo. South Island, Stewart Island: Plentiful throughout. Usually from 1000 to 5000 ft., but descends almost to sea-level in the south of Otago, and ascends to over 7000 ft. on Mount Egmont. Var. *intermedia*: Probably not uncommon from the Nelson Mountains southwards to Foveaux Strait, *Buchanan! T. Kirk! W. Townson! H. H. Allan! T. F. C.* Var. *breviligulata*.—North Island: Mount Egmont, *Petrie!* South Island: Not uncommon in mountain districts throughout, *Petrie!*

A very remarkable species. I have reunited Mr. Buchanan's *P. intermedia* with it, there being no differences save those of size and habit, in which respect the two forms pass into one another by insensible gradations. Professor Hackel also takes the same view. Small states of *P. caespitosa* can always be distinguished by the almost obsolete ligules and by the long crisped hairs on the callus of the flowering glume.

P. Colensoi is one of the most important of the indigenous pasture-grasses. It is eaten by all kinds of stock, and is a specially valuable sheep-grass in mountain districts.

20. **P. acicularifolia** *Buch. N.Z. Grasses* (1880) t. 49A.—Much branched at the base, forming compact leafy glaucous-green patches 2–6 in. across; branches short, curved, densely leafy. Culms very slender, almost filiform, smooth, naked for the greater part of their length, 2–6 in. high. Leaves imbricating on the branches, crowded, short, ⅙–½ in. long, involute and terete, curved, rigid, smooth, suddenly narrowed into an acute or acicular tip; sheaths short, pale, lax; ligules very long, sheathing, deeply 2-fid, membranous, hyaline, decurrent along the margins of the sheath. Panicle ½–1 in. long, broadly ovate, lax, of 3–10 spikelets; branches few, slender, capillary, scabrid. Spikelets compressed, about ¼ in. long, 3–6-flowered. Two outer glumes unequal, oblong-lanceolate, acute, 3-nerved, smooth or slightly scabrid above. Flowering glumes oblong-ovate, subacute, 5-nerved, densely villous with short silky hairs below the middle, minutely rough above,

P. antipoda Petrie sub. is. 2 478

callus sometimes with a tuft of crisped hairs. Palea almost as long as the glume, linear-oblong, silky on the keels. Anthers long, linear, about $\frac{1}{12}$ in. long.—*Cheesem. Man. N.Z. Fl.* (1906) 909.

South Island: Nelson—Mount Arthur, *A. Mackay!* Canterbury—Limestone rocks in the Broken River basin, *J. D. Enys! T. Kirk! T. F. C.* 2000–4000 ft.

Very closely allied to *P. Colensoi*, and chiefly distinguished by the peculiar habit, short rigid acicular leaves, and densely silky flowering glumes.

21. **P. pygmaea** *Buch. N.Z. Grasses* (1880) t. 50A.—Small, much branched, very densely tufted, forming compact rigid patches 2–4 in. diam. and $\frac{1}{2}$–1 in. high. Culms very short, clothed throughout with densely imbricating leaves. Leaf-blades very short, $\frac{1}{8}$–$\frac{1}{3}$ in. long, extremely rigid and coriaceous, folded, about $\frac{1}{20}$ in. broad when spread out, subacute, strongly grooved, quite smooth; ligules broad, thin. Panicle reduced to 1–3 spikelets; pedicels short, smooth. Spikelets about $\frac{1}{6}$ in. long, brownish-green, often tinged with purple, 3–5-flowered. Two outer glumes slightly unequal, oblong-lanceolate, acute, 3-nerved, quite smooth. Flowering glumes ovate, subacute, faintly 5-nerved, smooth, lower half clothed with short white silky hairs. Palea $\frac{1}{4}$ shorter than the glume, ciliate on the keels. Anthers long, linear.—*Cheesem. Man. N.Z. Fl.* (1906) 909.

South Island: Otago—Summit of Mount Pisa, altitude 6000 ft., *Petrie!*

A very remarkable little species, quite unlike any other.

22. **P. Kirkii** *Buch. N.Z. Grasses* (1880) t. 51B.—Culms tufted, erect, compressed, smooth, leafy, 3–5-noded, 6–18 in. high. Leaves much shorter than the culms, erect, 1–4 in. long, $\frac{1}{15}$–$\frac{1}{6}$ in. broad, linear, gradually tapering to an acuminate point, flat, smooth or the margins scabrid above, striate; sheaths compressed, grooved, the uppermost long, often sheathing the greater part of the culm; ligules long, membranous, erect. Panicle oblong or oblong-ovate, lax, erect, 2–5 in. long; rhachis slender, flexuous, smooth or minutely scaberulous; branches in alternate pairs or in alternate fascicles of 3–5, unequal, slender, sparingly divided, smooth or scaberulous. Spikelets elliptic-oblong, compressed, green or purplish-green, $\frac{1}{6}$–$\frac{1}{4}$ in. long, 3–5-flowered. Two outer glumes unequal, $\frac{1}{2}$–$\frac{2}{3}$ the length of the whole spikelet, oblong-lanceolate, acute, 3-nerved, smooth or scabrid along the keel. Flowering glumes oblong-ovate, obtuse, prominently 5-nerved, smooth or minutely scabrid on the keel and nerves above, glabrous or rarely with a tuft of crisped hairs on the callus. Palea about $\frac{1}{4}$ shorter than the glume, linear-oblong, ciliate on the keels. Anthers linear-oblong, $\frac{1}{20}$ in. long.—*Cheesem. Man. N.Z. Fl.* (1906) 910; *Ill. N.Z. Fl.* ii (1914) t. 232. P. purpurea *T. Kirk in Trans. N.Z. Inst.* ix (1877) 500 (*name only*).

Var. **Mackayi** *Hack. MSS.*—Taller and stouter; leaves often $\frac{1}{4}$ in. broad. Spikelets larger, $\frac{1}{3}$ in. long. Flowering glumes often with a tuft of long crisped hairs on the callus. Anthers $\frac{1}{15}$ in. long.—P. Mackayi *Buch. N.Z. Grasses* (1880) t. 50A.

Var. **Collinsii** *Hack. MSS.*—Slender, pale-green, laxly tufted, 1–2 ft. high; nodes of the culm usually naked. Panicle 3–6 in. long, very lax; branches long, slender. Spikelets as in the type, but rather larger.—P. Collinsii *Kirk ex Petrie in Trans. N.Z. Inst.* xxviii (1896) 589 (*name only*).

North Island: Mount Egmont, *Petrie! T. F. C.;* Ruahine Mountains, *B. C. Aston!* Tararua Range, *H. H. Travers! T. P. Arnold!* South Island: Abundant in subalpine localities throughout. Var. *Collinsii:* Mount Fyffe (Marlborough), *T. Kirk!* Hooker Valley, *T. F. C.* 2000–5000 ft.

A variable plant. Buchanan's *P. Mackayi* looks different at first sight, from its larger spikelets and broader leaves, but is connected with the type by intermediate forms. On the Mount Arthur Plateau, Nelson, the two varieties can be seen to merge into one another. *P. Collinsii* is a taller and more slender plant, with a larger and laxer panicle, but the structure of the spikelets is the same as in the type. *P. Kirkii* is a valuable grass for all kinds of stock in cool elevated localities, and is well worth cultivation.

23. **P. Lindsayi** *Hook. f. Handb. N.Z. Fl.* (1864) 340.—Culms numerous, densely tufted, very slender, erect, quite smooth, leafy at the base, naked above, 3–12 in. high. Leaves much shorter than the culms, ½–3 in. long, very narrow, flat or involute, soft and flaccid, quite smooth, pale-green or bluish-green; sheaths short or the upper alone long, narrow, grooved; ligules oblong, membranous, hyaline. Panicle broadly ovate or oblong, erect, lax, 1–4 in. long; rhachis slender, smooth; branches rather distant, binate or ternate, spreading, very slender, capillary, smooth or scaberulous, simple or sparingly divided, bearing a few spikelets towards the tip. Spikelets $\frac{1}{10}$–$\frac{1}{8}$ in. long, ovate, brownish-green or silvery-brown, 4–6-flowered. Two outer glumes unequal, about ½ as long as the spikelet, oblong-ovate, subacute, 3-nerved, membranous. Flowering glumes broadly oblong, obtuse, faintly 5-nerved, silky throughout with short hairs, but no tuft of crisped hairs on the callus; margins white, membranous. Palea slightly shorter than the glume, ciliate on the keels. Anthers small, oblong, about $\frac{1}{40}$ in. long.—*Buch. N.Z. Grasses* (1880) t. 52; *Cheesem. Man. N.Z. Fl.* (1906) 910.

North Island: Hawke's Bay — Ruataniwha Plains, *Tryon!* South Island: Not uncommon from the south of Nelson to Foveaux Strait. Sea-level to 5000 ft.

A pretty and distinct species, easily recognized by its small size and slender delicate habit, lax panicle, small silvery-brown spikelets, and faintly nerved silky flowering glumes. Hooker describes the flowering glumes as glabrous and nerveless, but I do not find them so.

24. **P. incrassata** *Petrie in Trans. N.Z. Inst.* xxxiv (1902) 394.—Culms small, densely tufted, quite smooth and glabrous, leafy, 2–4 in. high. Leaves equalling or sometimes overtopping the culms, erect or slightly spreading, slender, smooth, flaccid, very narrow, almost setaceous, complicate when dry; sheaths rather lax, almost as long as the blade, grooved; ligules short, membranous, truncate. Panicle ½–1 in. long, lax, of 3–6 spikelets on rather long smooth pedicels. Spikelets ⅛–$\frac{1}{6}$ in. long, broadly oblong, rather turgid, purplish-brown, 3–4-flowered. Two outer glumes subequal, about ½ the length of the flowering glumes immediately above them, oblong, obtuse, 3-nerved, quite smooth. Flowering glumes broadly oblong, obtuse, prominently 5-nerved, quite smooth and glabrous. Palea almost as long as the glume, linear-oblong, minutely ciliate on the keels. Anthers oblong, minute, about $\frac{1}{50}$ in. long.—*Cheesem. Man. N.Z. Fl.* (1906) 911. P. Campbellensis *Petrie in Trans. N.Z. Inst.* 1 (1918) 211.

Auckland and Campbell Islands: Port Ross, *B. C. Aston, F. R. Chapman!* Campbell Island, *B. C. Aston.*

I have seen very few specimens of this species, and the above description will probably require modification when a larger series is obtained. It appears to be nearest to *P. exigua*, but the panicle is much more lax, the spikelets larger and more turgid, and the outer glumes are much shorter. I am unable to separate Mr. Petrie's *P. Campbellensis* from the type.

25. **P. exigua** *Hook. f. Handb. N.Z. Fl.* (1864) 338.—Culms densely tufted, small, slender, quite smooth and glabrous, leafy, 1–5 in. high. Leaves numerous, shorter than the culms or rarely equalling them, ½–3 in. long, very narrow, involute, setaceous, erect, soft and flaccid, smooth; sheaths lax, thin, grooved; ligules short, white, membranous. Panicle small, ¼–¾ in. long, rarely more, narrow, contracted, usually dense-flowered; branches few, short, erect. Spikelets few or many, green tinged with purplish-red, ovate, small, $\frac{1}{10}$–⅛ in. long, 2–3-flowered. Two outer glumes unequal, membranous, minutely scabrid on the upper part of the keel; lower oblong-lanceolate, acute, 1-nerved; upper larger and broader, ¾ the length of the whole spikelet, oblong, obtuse, 3-nerved. Flowering glumes broadly oblong with white membranous margins, obtuse, 5-nerved, smooth or minutely scaberulous on the keel above, quite glabrous at the base. Palea linear-oblong, glabrous. Anthers oblong, minute, about $\frac{1}{50}$ in. long.—*Buch. N.Z. Grasses* (1880) t. 50B; *Cheesem. Man. N.Z. Fl.* (1906) 911.

South Island: Canterbury—Mount Arrowsmith, *Cockayne* and *R. M. Laing;* Lake district, *Hector* and *Buchanan;* Mount Pisa, Hector Mountains, Mount Cardrona, *Petrie!* Humboldt Mountains, *Cockayne!* 3500–6000 ft.

26. **P. Maniototo** *Petrie in Trans. N.Z. Inst.* xxii (1890) 443.—Culms forming small compact tufts, slender, leafy below, naked and filiform above, smooth and glabrous, 1–3 in. high. Leaves much shorter than the culms, pale glaucous-green; blade ¼–¾ in. long, very narrow, filiform, involute and almost terete, grooved down the back, obtuse at the tip; sheaths broad, pale, membranous, grooved; ligules long, broad, hyaline, often bifid or irregularly lacerate. Panicle reduced to an oblong spike-like head ¼–⅓ in. long of 4–12 spikelets. Spikelets pale glaucous-green, about ⅙ in. long, ovate, 4–7-flowered. Two outer glumes subequal, ovate-oblong, acute, the lower 1-nerved, the upper 3-nerved with the lateral nerves faint. Flowering glumes ovate-oblong, obtuse, faintly 3–5-nerved, the lateral nerves sometimes obsolete, silky all over with very short crisped hairs. Palea shorter than the glume, linear-oblong, silky on the keels. Anthers oblong, very minute, about $\frac{1}{75}$ in. long.—*Cheesem. Man. N.Z. Fl.* (1906) 912.

South Island: Canterbury—Broken River basin, Mackenzie Plains, *T. F. C.;* Mount Arrowsmith, *Cockayne* and *R. M. Laing.* Otago—Dry plains in the interior, Kurow, Maniototo, Bendigo, Mount Pisa, *Petrie!* Lake Wanaka, *T. Kirk!* 1200–3000 ft.

27. **P. sclerophylla** *Berggr. in Minneskr. Fisiog. Sallsk. Lund.* (1877) 30.—Forming small dense tufts. Culms stout, erect, rigid, compressed, leafy, 2–8 in. high. Leaves numerous towards the base of the culms and sheathing their whole length, much shorter than them, glaucous or greenish-grey, everywhere rough with minute projections; blade ½–2 in. long, narrow, folded, $\frac{1}{16}$–⅛ in. broad when spread out, rigid and coriaceous, acute or almost pungent, straight or curved, strongly grooved, quite glabrous; sheaths broader than the blade, pale, compressed, the upper 1 or 2 very long and sheathing the culm; ligules rather long, membranous. Panicle ¾–2 in. long, very narrow, contracted, dense, spiciform, pale whitish-green; branches numerous, short, erect. Spikelets numerous, small, about ⅛ in. long, 2–4-flowered. Two outer glumes subequal, about ⅔ the length of the whole spikelet, oblong-lanceolate, acute, 3-nerved, the lateral nerves faint.

27. P. buchanani Zotov. 73: 231.

Flowering glumes broadly oblong, obtuse, 5-nerved, margins white and membranous, surfaces very minutely rough, quite glabrous. Palea linear-oblong, glabrous. Anthers oblong, small, about $\frac{1}{40}$ in. long. Ripe grain adherent to the palea.—*Cheesem. Man. N.Z. Fl.* (1906) 912. P. albida *Buch. N.Z. Grasses* (1880) t. 50c. P. anceps *var.* alpina *Hook. f. Handb. N.Z. Fl.* (1864) 339.

South Island: Probably not uncommon on dry shingle slopes in alpine localities. Nelson—Mount Percival, *T. F. C.;* Mount Captain, *T. Kirk.* Canterbury—Mount Torlesse, *Berggren, Petrie!* mountains above the Broken River, *T. F. C.;* Mount Peel, *H. H. Allan!* Mount Dobson and Mount Darwin, *Haast;* Mount Cook district, *T. F. C.* Otago—Mount St. Bathan's, Mount Ida, Mount Kyeburn, *Petrie!* 3500–6000 ft.

A very peculiar and distinct little species, quite unlike any other.

Sprengel 1807-8. p.340.

28. **P. imbecilla** *Forst. f. Prodr.* (1786) n. 499 (*name only*).—Culms tufted, branched and decumbent at the base, ascending or erect above, weak, very slender, often filiform, quite smooth and glabrous, leafy, 3–14 in. high. Leaves shorter than the culms, very narrow, $\frac{1}{30}$–$\frac{1}{15}$ in. broad, flat, flaccid; sheaths narrow, smooth, grooved, the upper often long; ligules rather long, membranous. Panicle very lax and slender, 1–5 in. long; branches in alternate fascicles of 3–5 or in small specimens binate or solitary, long, spreading, capillary, minutely scaberulous. Spikelets on long pedicles, small, green, $\frac{1}{10}$–$\frac{1}{8}$ in. long, laxly 2–6-flowered. Two outer glumes unequal, often small, from $\frac{1}{3}$ to $\frac{1}{2}$ the length of the flowering glumes immediately above them, ovate or ovate-oblong, obtuse or subacute, 3-nerved. Flowering glumes often remote, oblong or broadly oblong, obtuse, faintly 3-nerved, or occasionally 5-nerved with the intermediate nerve on each side indistinct, smooth and glabrous, or slightly scabrid on the keel and sometimes on the nerves above, no tuft of hairs on the callus. Palea about $\frac{3}{4}$ the length of the glume, linear-oblong, ciliate on the keels. Anthers oblong, minute, about $\frac{1}{60}$ in. long.—*Spreng. Fl. Hal. Mant.* i, 33; *A. Cunn. Precur.* (1836) n. 263; *Raoul Choix* (1846) 39; *Hook. f. Fl. Nov. Zel.* i (1853) 306; *Handb. N.Z. Fl.* (1864) 337; *Buch. N.Z. Grasses* (1880) t. 53b; *Cheesem. Man. N.Z. Fl.* (1906) 913. Eragrostis imbecilla *Benth. Fl. Austral.* vii (1878) 643.

Var. **breviglumis** *Cheesem.*—Two outer glumes very unequal, the lower sometimes nearly obsolete. Other characters very much as in the type.—P. breviglumis *Hook. f. Fl. Antarct.* i (1844) 101; *Cheesem. Man. N.Z. Fl.* (1906) 913.

Var. **Matthewsii** *Hack. MSS.*—Taller, 10–20 in. high. Panicle larger, 4–8 in. long. Spikelets rather larger, 4–6-flowered. Flowering glumes closer, usually 5-nerved, but the intermediate nerves on each side often very faint.—P. Matthewsii *Petrie in Trans. N.Z. Inst.* xxxiv (1902) 392. P. breviculmis *Hook. f. Handb. N.Z. Fl.* (1864) 337 (*in part*).

North and South Islands, Stewart Island, Chatham Islands: Not uncommon in shaded places throughout. Sea-level to 4000 ft. Var. *breviglumis:* Auckland and Campbell Islands, *Hooker! T. Kirk! F. R. Chapman!* Var. *Matthewsii:* Not uncommon from North Canterbury southwards to Foveaux Strait.

As a species, *P. imbecilla* is well characterized by the slender flaccid habit, small spikelets with minute outer glumes, and obtuse glabrous flowering glumes, which are usually 3-nerved in the typical form, but generally 5-nerved in var. *Matthewsii.* It is said to occur in Australia. In the first edition of this work I maintained Hooker's *P. breviglumis* as a separate species; but the examination of additional specimens and the perusal of Petrie's paper "On *Poa breviglumis*" (Trans. N.Z. Inst. xlii (1910) 197) have convinced me that it cannot be separated as a species from *P. imbecilla.*

PUCCINELLIA Parl. H. Hal. i, 366. (1846)

See Allan & Jansen Trans. 69: 262. + 15: 256.

29. ATROPIS Rupr. 1853

Annual or perennial grasses. Leaves linear, flat or plicate or convolute; ligules hyaline. Spikelets 3- to many-flowered, narrow, laterally compressed or almost cylindric, in open or contracted panicles; rhachilla disarticulating above the two outer glumes and between the flowering glumes, glabrous, produced beyond the uppermost flower. Two outer glumes persistent, broad, empty, unequal, rounded on the back, 1–3-nerved. Flowering glumes broad, oblong, obtuse, rounded on the back, 5-nerved, nerves often obscure. Palea nearly as long as the flowering glume, 2-keeled. Lodicules 2, large, ovate, usually distinct. Stamens 3. Ovary glabrous; styles wanting; stigmas plumose. Grain enclosed in the hardened flowering glume and palea, oblong, almost semiterete; hilum small, basal, punctiform.

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A small genus of 15 or 20 species, mostly from the temperate regions of the Northern Hemisphere. It differs from *Poa* principally in the flowering glumes being rounded on the back, not keeled.

* Panicle contracted in flower, open in fruit.

6–18 in. high. Spikelets $\frac{1}{4}$–$\frac{1}{3}$ in., 5–9-flowered	1. *A. stricta.*

** Panicle contracted in both flower and fruit.

Small, very slender, 4–8 in. high, 2-noded. Spikelets $\frac{1}{3}$ in., 5–6-flowered	2. *A. antipoda.*
Slender, 4–14 in. high, 3–4-noded. Spikelets $\frac{1}{4}$ in., 4–5-flowered ..	3. *A. Walkeri.*
Stout, loosely tufted, 9–18 in. high, 4–5-noded. Spikelets $\frac{1}{4}$–$\frac{1}{3}$ in., 4–6-flowered	4. *A. Chathamica.*

1. **A. stricta** (orth f.) *Hack. MSS.*—Annual. Culms tufted, strict, erect, quite glabrous, leafy, 3–4-noded, the uppermost node below the middle, 6–18 in. high. Leaves sheathing almost the whole of the culm, narrow, setaceously involute, strict, erect, quite smooth; sheaths pale, lower rather lax; ligules ovate, membranous. Panicle slender, contracted when in flower, 3–6 in. long; branches very unequal, in distant fascicles of 2–5, strict, erect in flower, spreading in fruit, simple or sparingly branched. Spikelets alternate on the branchlets, narrow, almost terete, pale, $\frac{1}{4}$–$\frac{1}{3}$ in. long, 5–9-flowered. Two outer glumes very unequal, the lower narrow-ovate, acute, 1-nerved, not $\frac{1}{2}$ the length of the flowering glume above it; upper twice as long as the lower, subacute, 3-nerved. Flowering glumes oblong, obtuse and hyaline at the tips, distinctly 5-nerved, but the nerves disappearing below the tip, quite smooth and glabrous. Palea shorter than the glume, linear-oblong, ciliolate along the keels. Lodicules distinct. Anthers oblong, about $\frac{1}{40}$ in. long.—*Cheesem. Man. N.Z. Fl.* (1906) 914. Glyceria stricta *Hook. f. Fl. Nov. Zel.* i (1853) 304; *Handb. N.Z. Fl.* (1864) 336; *Fl. Tasm.* ii (1860) 123, t. 162B; *Benth. Fl. Austral.* vii (1878) 658; *Buch. N.Z. Grasses* (1880) t. 41A.

Var. **suborbicularis** *Hack. MSS.*—Flowering glume much broader than in the type, in outline almost orbicular. Leaves weaker and thinner.

NORTH AND SOUTH ISLANDS: Not uncommon in brackish-water marshes from the Bay of Islands southwards to the Bluff. Var. *suborbicularis:* Banks Peninsula, *R. M. Laing;* near Oamaru, *Petrie!* AUCKLAND ISLANDS: Enderby Island, *B. C. Aston!*

Also in Australia and Tasmania. The northern *A. distans* Griseb., which is closely allied to *A. stricta*, is naturalized in several localities. It is not nearly so strict, the leaves are flatter, the panicle not so contracted, and the spikelets are much smaller.

2. **A. antipoda** (*Petrie*) *in Subantarct. Is. N.Z.* (1909) 480.—Pale-green, tufted, leafy, 4–8 in. high. Culms numerous, strict, erect, smooth and glabrous, 2-noded, upper node placed near the middle of the culm. Leaves sheathing the culm as far as the panicle, and often including the lower part of it, strict, erect, complicate, or nearly flat, striate, narrowed into long attenuate points; sheaths long, lax, fissured to the base, rather broad, pale, smooth and glabrous; ligules oblong, membranous, lacerate at the tip. Panicle 2–3 in. long, narrow, contracted, pale whitish-green, not equalling the leaves; branches unequal, in fascicles of 2 or 3, erect, sparingly divided. Spikelets $\frac{1}{3}$ in. long, shortly pedicelled, 5–6-flowered. Two outer glumes unequal, about $\frac{1}{2}$ the length of the spikelet, narrow-lanceolate, acuminate, lower 1-nerved, upper 3-nerved. Flowering glumes narrow oblong-lanceolate, subacute, 5-nerved, the median nerve slightly excurrent, glabrous except for a few hairs on the callus. Palea slightly shorter than the flowering glume; margins ciliate.

Auckland Islands: *T. Kirk! B. C. Aston!* Antipodes Island: *B. C. Aston!*

This is closely allied to *A. Walkeri*, but appears to differ in the smaller size and more slender habit, 2-noded culm, and in the larger number of florets in the spikelets.

3. **A. Walkeri** *Cheesem. n. comb.*—Annual, pale whitish-green. Culms densely tufted, erect, quite glabrous, leafy, 3–4-noded, the uppermost node much above the middle, 4–14 in. high. Leaves sheathing the whole of the culm, strict, erect, complicate, striate; sheaths compressed, usually longer than the blades, grooved; ligules broad, membranous, hyaline, irregularly toothed at the tip. Panicle 2–6 in. long, erect, contracted, dense, pale whitish-green; branches in fascicles of 2–7, very unequal, short, smooth, erect. Spikelets numerous, sessile or shortly pedicelled, about $\frac{1}{4}$ in. long, 4–5-flowered. Two outer glumes slightly unequal, about $\frac{1}{2}$ the length of the whole spikelet; lower narrow, lanceolate, acute, 1-nerved, sometimes with a short lateral nerve on each side; upper broader and more obtuse, 3-nerved. Flowering glumes oblong or oblong-ovate, obtuse and hyaline at the tip, with sometimes an obscure notch on each side, 5-nerved, glabrous or slightly hairy on the back near the base. Palea as long as the glume, linear-oblong, minutely bidentate at the tip, ciliolate on the nerves. Lodicules distinct. Anthers linear-oblong, about $\frac{1}{20}$ in. long.—A. novae-zealandiae *Hack. in Man. N.Z. Fl.* (1906) 915; *Cheesem. Man. N.Z. Fl.* (1906) 915. Poa Walkeri *T. Kirk in Trans. N.Z. Inst.* vii (1885) 224. Glyceria novae-zealandiae *Petrie in Trans. N.Z. Inst.* xxxiii (1901) 329.

South Island: Brackish-water marshes on the south coast of Otago, *T. Kirk! Petrie!* Stewart Island: East coast, local, *T. Kirk!*

Easily distinguished from the preceding by the stouter habit, denser panicle with shorter branches, smaller pale whitish-green spikelets with fewer florets, much larger empty glumes, and narrower and more pointed flowering glumes.

4. **A. Chathamica** (*Cheesem.*) *n. sp.*—Tall, stout, loosely tufted, perfectly smooth and glabrous, 9–18 in. high. Culms erect or decumbent at the base, 4-noded, the upper node placed about the middle; innovation-shoots intravaginal. Leaves numerous, those at the base short and scale-like, membranous, without any lamina; cauline leaves sheathing the whole culm and the greater part of the panicle, perfectly smooth and glabrous, pale whitish-green, folded, grooved, tip cartilaginous, subobtuse; sheaths very large and broad, longer than the blades, split to the base, compressed,

deeply striate; ligules broad, transversely oblong, membranous. Panicle narrow-linear, 2–6 in. long, rigid, erect, glabrous; branches few, unequal, solitary or 2-nate, more rarely 3-nate, erect, often almost appressed to the rhachis. Spikelets $\frac{1}{3}$–$\frac{1}{4}$ in. long, narrow-lanceolate, 4–6-flowered. Two outer glumes unequal, the longer one about $\frac{1}{3}$ the length of the spikelet, lanceolate, 3–nerved; the shorter broader, 1-nerved. Flowering glume oblong-ovate, subacute, faintly 3-nerved, glabrous, or a fine tuft of silky hairs on the callus. Palea nearly as long as the glume, margins ciliate.

CHATHAM ISLANDS: Exact locality not stated, *F. A. D. Cox!*

This appears to be a distinct species, easily recognized by its stout loosely tufted habit, long narrow panicle, and narrow many-flowered spikelets.

30. **FESTUCA** Linn. 1735.

Perennial or rarely annual grasses. Leaves flat or complicate or convolute, often setaceous; ligules scarious. Spikelets 2- to many-flowered, arranged in open or contracted often unilateral panicles; rhachilla disarticulating above the two outer glumes and between the flowering glumes. Two outer glumes unequal or subequal, empty, persistent, more or less keeled, 1–3-nerved. Flowering glumes lanceolate, acute or acuminate or awned, rounded on the back or slightly keeled towards the tip, herbaceous, 5–7-nerved; awn from the tip or close to it, straight; callus glabrous or nearly so. Palea 2-keeled, more or less 2-toothed, scabrid or ciliolate along the keels. Lodicules 2. Stamens 3. Ovary glabrous or minutely hairy at the tip; styles distinct, very short; stigmas plumose. Grain enclosed within the slightly hardened flowering glume and palea and often adherent to the latter, oblong, concave or grooved in front; hilum long, linear.

A genus of about 120 species, mainly found in the temperate regions of the Northern Hemisphere, not so abundant in the South Temperate Zone, absent in the tropics except on high mountains. It differs from *Atropis* in the long linear hilum, and from *Poa* in the same character and in the flowering glumes being more or less rounded on the back and often awned.

* Flowering glumes not awned.

Culms 1½–3 ft., forming dense hard tussocks. Panicle 2–9 in. Spikelets turgid, ½–¾ in. long .. .. 1. *F. littoralis.*

** Flowering glumes awned; awn much shorter than the glume.

† Spikelets 4–8-flowered.

Culms 1–2 ft., forming dense tussocks. Leaves cylindric, scabrid. Spikelets ½ in. .. .. 2. *F. novae-zealandiae.*

Culms 1–2 ft., not forming tussocks. Leaves complicate, smooth. Spikelets large, ½–⅔ in. .. .. .. 3. *F. Matthewsii.*

Culms 9–18 in., few-noded, erect. Leaves flat or involute, smooth. Spikelets ¼–⅓ in. .. .. 4. *F. rubra.*

Culms 6–15 in., many-noded, decumbent at the base. Leaves more or less secund .. .. 5. *F. multinodis.*

†† Spikelets 2–3-flowered.

Culms 9–12 in., densely tufted. Leaves complicate, terete, strict, erect .. .. 6. *F. erecta.*

*** Flowering glumes awned; awn as long or longer than the glume.

Culms 6–18 in., densely tufted, stoloniferous. Leaves soft, pliant, terete. Panicle narrow, spiciform. Spikelets 3–5-flowered .. .. 7. *F. Coxii.*

1. **F. littoralis** *Labill. Pl. Nov. Holl.* i (1806) 22, t. 27.—Forming dense hard tussocks of a pale yellow-green colour. Culms branched at the base, erect, rigid, smooth and polished, 1½–3 ft. high. Leaves longer or shorter than the culms, narrow, so strongly involute that the blade is terete, erect, rigid and pungent-pointed, quite smooth and polished; sheaths pale, grooved; ligules short. Panicle 2–9 in. long, narrow, dense and spike-like; rhachis stout, angled, grooved; branches short, erect, usually few-flowered; pedicels short, pilose. Spikelets large, broad, flattened or somewhat turgid, ½–¾ in. long, 4–7-flowered, pale yellowish-green. Two outer glumes subequal, more than ½ as long as the spikelet, keeled, lanceolate, acuminate, 3–5-nerved, glabrous. Flowering glumes oblong-lanceolate, rounded on the back at the base, keeled above, 5–7-nerved, acute or very minutely notched at the tip, the central nerve stout and slightly protruding in the notch, equally minutely hairy all over, base of glume, callus, and rhachilla more or less densely clothed with short hairs. Palea lanceolate, ciliolate along the keels. Grain narrow-oblong, almost terete; hilum linear, very short.—*A. Rich. Fl. Nouv. Zel.* (1832) 123; *Hook. f. Fl. Tasm.* ii (1860) 138; *Handb. N.Z. Fl.* (1864) 341; *Buch. N.Z. Grasses* (1880) t. 54; *Cheesem. Man. N.Z. Fl.* (1906) 917. Schedonorus littoralis *Beauv. Agrost.* (1812) 99; *A. Cunn. Precur.* (1836) n. 259; *Raoul Choix* (1846) 39; *Hook. f. Fl. Nov. Zel.* i (1853) 310.

North and South Islands, Stewart Island, Chatham Islands: Abundant in sandy and rocky places near the shore. Also common on the coasts of temperate Australia.

Var. triticoides *Benth. Fl. Austral.* vii (1878) 656; *Buch. N.Z. Grasses* (1880) t. 54 (*left-hand figure*). F. triticoides *Steud. Syn. Gram.* (1855) 315 is not uncommon on many parts of the New Zealand coasts, and usually can be easily recognized by its greater size, larger spikelets, and 7-nerved flowering glumes. But Professor Hackel has pointed out that the differences are inconstant and not of sufficient weight to maintain it as a variety.

2. **F. novae-zealandiae** *Cockayne in Trans. N.Z. Inst.* xlviii (1916) 178.—Forming dense tussocks 1–2 ft. high. Culms slender, erect, scabrid, 3-noded. Leaves shorter than the culms or almost equalling them, strict, rigid, erect, very narrow, cylindric, setaceous, sharply acute or almost pungent, rough with minute scabrid points; sheaths fissured to the base, quite smooth and glabrous; ligules evidently biauricled, glabrous. Panicle linear-oblong, contracted but somewhat lax, 2–5 in. long; lower branches binate, 3–6-spiculate. Spikelets elliptic, ⅓ in. long, laxly 5–7-flowered. Two outer glumes linear-lanceolate, acuminate, margins and keel scaberulous. Flowering glumes narrow-lanceolate, mucronate or shortly awned at the tip.—F. ovina *var.* novae-zealandiae *Hack. in Cheesem. Man. N.Z. Fl.* (1906) 917; *Ill. N.Z. Fl.* ii (1914) t. 233. F. duriuscula *Hook. f. Fl. Nov. Zel.* i (1853) 309, *and Handb. N.Z. Fl.* (1864) 341 (*in part, but not of Linn.*).

North Island: Kaimanawa Mountains, *B. C. Aston!* Ruahine Mountains, *A. Hamilton!* South Island: Not uncommon in mountain districts throughout. Banks Peninsula, *R. M. Laing!* 1000–4000 ft.

I agree with Dr. Cockayne in considering that this plant should be treated as worthy of the rank of a species, a course which Professor Hackel was inclined to adopt when he first described it. It occupies a prominent place in large areas of the eastern slopes of the Southern Alps, and is of considerable economic importance.

3. **F. Matthewsii** *Cheesem. n. sp.*—Culms erect, quite smooth and glabrous, 12–24 in. high, 2-noded; upper node about the middle of the culm. Innovation-shoots few-leaved, elongate. Leaves almost equalling the culms,

narrow-linear, complicate, acute at the tip, furnished at the base with a brown pulvinate callus, glabrous without, ribbed when dry, puberulous within, 5-nerved, hexagonal in transverse section ; sheaths rather lax, open, quite smooth ; ligules 2-lobed, lobes acute, ciliolate. Panicle 3–6 in. long, ovate-oblong, lax, spreading, nodding ; rhachis and branches scabrid ; the latter binate, naked at the base, 1–3-spiculate at the top. Spikelets large, ovate-lanceolate, 5–7-flowered, $\frac{1}{2}$–$\frac{2}{3}$ in. long, dense-flowered, the upper shortly pedicelled, the remainder long-pedicelled. Two outer glumes unequal, lanceolate, acute, smooth. Flowering glumes linear-lanceolate, acute, narrowed into a rather long awn. Palea as long as or longer than the flowering glume, subulately bidentate ; keels scaberulous.—F. ovina *var.* Matthewsii *Hack. in Cheesem. Man. N.Z. Fl.* (1906) 918.

South Island : Otago—Mount Bonpland, *H. J. Matthews!*

This appears to me to be a perfectly distinct species, easily recognized by the large spikelets and curious pulvinate callus at the base of the leaf-blades.

4. **F. rubra** *Linn. Sp. Plant.* (1753) 74.—Culms 9–18 in. high, laxly or densely tufted, erect or geniculate at the base, smooth, striate, 2-noded ; innovation-shoots both intravaginal and extravaginal, the extravaginal ones ascending or stoloniferous and creeping. Leaves 3–6 in. long, narrow, those of the innovation-shoots and sometimes of the culms setaceous, but frequently the culm-leaves are broader and flat or involute when dry, 3–7-nerved, smooth, obtuse or subacute at the tip ; sheaths of the innovation-shoots tight, smooth, closed almost to the mouth ; ligules very short, glabrous, not auricled or obscurely so. Panicle very variable, 1–5 in. long, contracted, usually rather dense, erect or nodding, often secund ; rhachis angled, scabrid ; branches solitary or the lowest binate, divided almost from the base, scaberulous. Spikelets elliptic-lanceolate to oblong, $\frac{1}{4}$–$\frac{1}{2}$ in. long, laxly 4–8-flowered. Two outer glumes unequal ; lower lanceolate, acuminate, 1-nerved ; upper larger, ovate-lanceolate, 3-nerved. Flowering glumes oblong-lanceolate, involute and rounded on the back, faintly 5-nerved, shortly awned ; awn slender, scaberulous. Palea as long as the glume, linear-oblong, ciliolate on the keels.—*Cheesem. Man. N.Z. Fl.* (1906) 918. F. duriuscula *Hook. f. Fl. Nov. Zel.* i (1853) 309 ; *Handb. N.Z. Fl.* (1864) 341 (*for the most part, but not of Linn.*).

North and South Islands, Stewart Island : Abundant from the East Cape and the Upper Waikato southwards. Sea-level to 4500 ft.

According to Professor Hackel, this constitutes the greater part of the *F. duriuscula* of the "Flora Novae-Zelandiae" and the Handbook, the true *F. duriuscula* probably not existing in an indigenous state in New Zealand. It is very closely allied to *F. ovina*, differing mainly in the innovation-shoots being frequently stoloniferous, and usually both extravaginal and intravaginal, and in their sheaths being closed almost to the mouths ; also in the ligules not being auricled, and in the stem-leaves being usually broader and flatter than those on the innovation-shoots. It has considerable value as a sheep-grass, and is often sown on sheep-runs. From that fact it is doubtful whether some of the European forms that can now be readily collected even in remote districts may not have been introduced. Of some varieties, however, there is no reason to doubt their nativity. *F. rubra* has a wide range in Europe and northern Asia.

5. **F. multinodis** *Petrie and Hack. in Trans. N.Z. Inst.* xliv (1912) 186.—Culms densely tufted, decumbent or geniculate below, ascending above, branched and sometimes excessively so, leafy, 6–15 in. long, very slender, terete, many-noded ; innovation-shoots extravaginal. Leaves numerous, 10–12 to a culm, shorter than the culms, more or less secund,

smooth and glabrous, involute, setaceous, acute ; sheaths long, fissured to the base, not striate ; ligules short, glabrous. Panicle 1¼–2½ in. long, ovate-lanceolate, usually rather dense and compact ; rhachis and branches glabrous and angled ; branches solitary or the lower binate ; divisions few, glabrous. Spikelets ovate-lanceolate, ¼–⅓ in. long, shortly pedicelled or almost sessile, 4–8-flowered. Two outer glumes unequal ; lower lanceolate, acuminate, 1-nerved ; upper larger, ovate-lanceolate, 3-nerved. Flowering glumes rounded on the back, oblong-lanceolate, acute, faintly 5-nerved. Awn variable, sometimes short and almost wanting, at other times well developed. Palea as long as the flowering glume, linear-oblong, the keels smooth.

North Island : Shores of Port Nicholson, and rocky slopes of Cook Strait, *T. Kirk ! B. C. Aston ! D. Petrie ! T. F. C.* South Island : Awatere Valley and Banks Peninsula, *Cockayne !*

6. **F. erecta** *D'Urv. in Mem. Soc. Linn. Paris*, iv (1826) 601.—Perennial, densely tufted, 8–12 in. high. Culms strict, erect, 2-noded or rarely 3-noded, the lowest node near the base, quite smooth and glabrous. Leaves usually overtopping the culms, narrow, strict, erect, quite glabrous ; sheaths rather lax, much broader than the blades, ⅛–⅓ in. diam., pale, thin and membranous, striate ; blades narrow, $\frac{1}{15}$–$\frac{1}{12}$ in. across, complicate and appearing almost terete, quite smooth, faintly 10–12-ribbed on the outside, the ribs much more prominent on the inner face, which is usually furnished with short stiff hairs ; apex of leaf rigid and pungent. Panicle contracted, narrow, erect, 2½–4 in. long ; rhachis angular, finely scabrid [illegible] branches usually solitary, or the lower a little remote ;

awns,
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upper
back,
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erulous
. *Vascl.*
Festuca
Man.

N.Z. Fl. (1906) 919 ; *Petrie in Subantarct. . .*

Macquarie Island : Rocks near the sea, not uncommon, *Dr. Scott ! A. Hamilton ! H. Hamilton !*

Also found in Fuegia, Falkland Islands, and Kerguelen. But for its absence from the New Zealand Subantarctic Islands it might be included in the "circumpolar species" that are found throughout the ring or zone of widely separated islands that girdle the Antarctic seas within the parallels of 45° S. to 60° S. I am indebted to Dr. Stapf, of the Kew Herbarium, for comparing some of Mr. Hamilton's specimens with Fuegian examples, and for informing me that they quite correspond.

7. **F. Coxii** *Hack. in Cheesem. Man. N.Z. Fl.* (1906) 919.—Rhizome stout, creeping. Culms densely tufted, branched at the base, erect or slightly geniculate, slender, smooth, leafy, 6–18 in. high. Leaves numerous, longer than the culms, slender, soft, pliant, the margins so much involute that the leaf is terete, smooth on the back, midrib prominent on the inner face ; sheaths rather lax, thin, smooth, striate, open to the base ; ligules very short, truncate, ciliolate at the tip. Panicle 2–3 in. long, narrow, rather dense, often reduced to a simple raceme or spike, or with 2–3-spiculate branches in the lower part ; rhachis stout, angled, scabrid ; branches or pedicels very short, stout, scabrid, the upper spikelets nearly sessile.

narrow-linear, complicate, acute at the tip, furnished at the base with a brown pulvinate callus, glabrous without, ribbed when dry, puberulous within, 5-nerved, hexagonal in transverse section ; sheaths rather lax, open, quite smooth ; ligules 2-lobed, lobes acute, ciliolate. Panicle 3–6 in. long, ovate-oblong, lax, spreading, nodding ; rhachis and branches scabrid ; the latter binate, naked at the base, 1–3-spiculate at the top. Spikelets large, ovate-lanceolate, 5–7-flowered, $\frac{1}{2}$–$\frac{2}{3}$ in. long, dense-flowered, the upper shortly pedicelled, the remainder long-pedicelled. Two outer glumes unequal, lanceolate, acute, smooth. Flowering glumes linear-lanceolate, acute, narrowed into a rather long awn. Palea as long as or longer than the flowering glume, subulately bidentate ; keels scaberulous.—F. ovina *var.* Matthewsii *Hack. in Cheesem. Man. N.Z. Fl.* (1906) 918.

South Island : Otago—Mount Bonpland, *H. J. Matthews!*

This appears to me to be a perfectly distinct species, easily recognized by the large spikelets and curious pulvinate callus at the base of the leaf-blades.

4. **F. rubra** *Linn. Sp. Plant.* (1753) 74.—Culms 9–18 in. high, laxly or densely tufted, erect or geniculate at the base, smooth, striate, 2-noded ; innovation-shoots both intravaginal and extravaginal, the extravaginal ones ascending or stoloniferous and creeping. Leaves 3–6 in. long, narrow, those of the innovation-shoots and sometimes of the culms setaceous, but frequently the culm-leaves are broader and flat or involute when dry, 3–7-nerved, smooth, obtuse or subacute at the tip ; sheaths of the innovation-shoots tight, smooth, closed almost to the mouth ; ligules very short, glabrous, not auricled or obscurely so. Panicle very variable, 1–5 in. long, usual branc lous. Two larger involu slend on th *Fl. N but no*

Festuca rubra, Linn.

not native to N.Z. see T.N.Z.I.

vol. 57, p. 64. (Ckn. & Allan).

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According to Professor Hackel, this constitutes the greater part of the *F. duriuscula* of the "Flora Novae-Zelandiae" and the Handbook, the true *F. duriuscula* probably not existing in an indigenous state in New Zealand. It is very closely allied to *F. ovina*, differing mainly in the innovation-shoots being frequently stoloniferous, and usually both extravaginal and intravaginal, and in their sheaths being closed almost to the mouths ; also in the ligules not being auricled, and in the stem-leaves being usually broader and flatter than those on the innovation-shoots. It has considerable value as a sheep-grass, and is often sown on sheep-runs. From that fact it is doubtful whether some of the European forms that can now be readily collected even in remote districts may not have been introduced. Of some varieties, however, there is no reason to doubt their nativity. *F. rubra* has a wide range in Europe and northern Asia.

5. **F. multinodis** *Petrie and Hack. in Trans. N.Z. Inst.* xliv (1912) 186.—Culms densely tufted, decumbent or geniculate below, ascending above, branched and sometimes excessively so, leafy, 6–15 in. long, very slender, terete, many-noded ; innovation-shoots extravaginal. Leaves numerous, 10–12 to a culm, shorter than the culms, more or less secund,

smooth and glabrous, involute, setaceous, acute ; sheaths long, fissured to the base, not striate ; ligules short, glabrous. Panicle 1¼–2½ in. long, ovate-lanceolate, usually rather dense and compact ; rhachis and branches glabrous and angled ; branches solitary or the lower binate ; divisions few, glabrous. Spikelets ovate-lanceolate, ¼–⅓ in. long, shortly pedicelled or almost sessile, 4–8-flowered. Two outer glumes unequal ; lower lanceolate, acuminate, 1-nerved ; upper larger, ovate-lanceolate, 3-nerved. Flowering glumes rounded on the back, oblong-lanceolate, acute, faintly 5-nerved. Awn variable, sometimes short and almost wanting, at other times well developed. Palea as long as the flowering glume, linear-oblong, the keels smooth.

North Island : Shores of Port Nicholson, and rocky slopes of Cook Strait, *T. Kirk ! B. C. Aston ! D. Petrie ! T. F. C.* South Island : Awatere Valley and Banks Peninsula, *Cockayne !*

6. **F. erecta** *D'Urv. in Mem. Soc. Linn. Paris*, iv (1826) 601.—Perennial, densely tufted, 8–12 in. high. Culms strict, erect, 2-noded or rarely 3-noded, the lowest node near the base, quite smooth and glabrous. Leaves usually overtopping the culms, narrow, strict, erect, quite glabrous ; sheaths rather lax, much broader than the blades, ⅕–⅓ in. diam., pale, thin and membranous, striate ; blades narrow, $\frac{1}{15}$–$\frac{1}{12}$ in. across, complicate and appearing almost terete, quite smooth, faintly 10–12-ribbed on the outside, the ribs much more prominent on the inner face, which is usually furnished with short stiff hairs ; apex of leaf rigid and pungent. Panicle contracted, narrow, erect, 2½–4 in. long ; rhachis angular, finely scabrid on the angles ; branches usually solitary, or the lower a little remote ; lateral branches very short. Spikelets ⅔–⅘ in. long including the awns, 2–3-flowered ; two outer glumes unequal, lanceolate, acuminate, from ¾–⅘ the length of the entire spikelet ; lower faintly 3-nerved, upper distinctly 3-nerved. Flowering glumes lanceolate, rounded on the back, faintly scaberulous, rather thin, distinctly 5-nerved, narrowed into a short stiff awn. Palea shorter than the glume, narrow-lanceolate, scaberulous on the keels. Grain narrow-obovoid ; hilum long, linear.—*Cheesem. Vascl. Fl. Macquarie Is.* (1919) 37 ; *Hook. f. Fl. Antarct.* ii (1847) 384. Festuca contracta *T. Kirk in Trans. N.Z. Inst.* xxvii (1898) 353 ; *Cheesem. Man. N.Z. Fl.* (1906) 919 ; *Petrie in Subantarct. Is. N.Z.* ii (1909) 479.

Macquarie Island : Rocks near the sea, not uncommon, *Dr. Scott ! A. Hamilton ! H. Hamilton !*

Also found in Fuegia, Falkland Islands, and Kerguelen. But for its absence from the New Zealand Subantarctic Islands it might be included in the "circumpolar species" that are found throughout the ring or zone of widely separated islands that girdle the Antarctic seas within the parallels of 45° S. to 60° S. I am indebted to Dr. Stapf, of the Kew Herbarium, for comparing some of Mr. Hamilton's specimens with Fuegian examples, and for informing me that they quite correspond.

7. **F. Coxii** *Hack. in Cheesem. Man. N.Z. Fl.* (1906) 919.—Rhizome stout, creeping. Culms densely tufted, branched at the base, erect or slightly geniculate, slender, smooth, leafy, 6–18 in. high. Leaves numerous, longer than the culms, slender, soft, pliant, the margins so much involute that the leaf is terete, smooth on the back, midrib prominent on the inner face ; sheaths rather lax, thin, smooth, striate, open to the base ; ligules very short, truncate, ciliolate at the tip. Panicle 2–3 in. long, narrow, rather dense, often reduced to a simple raceme or spike, or with 2–3-spiculate branches in the lower part ; rhachis stout, angled, scabrid ; branches or pedicels very short, stout, scabrid, the upper spikelets nearly sessile.

Spikelets about ¾ in. long with the awns, laxly 3–5-flowered. Two outer glumes unequal, from ½ to ¾ the length of the whole spikelet, narrowed into long acuminate scabrid points; lower linear, 1-nerved; upper longer, narrow-lanceolate, 3-nerved. Flowering glumes oblong-lanceolate, firm, rounded on the back, concave, faintly 5-nerved, gradually narrowed into a terete scabrid awn as long or longer than the glume, surface densely minutely scabrid, callus glabrous. Palea as long as the glume, deeply 2-fid, serrulate along the keels. Grain linear-oblong, deeply grooved; hilum ⅘ the length of the grain.—Agropyrum Coxii *Petrie in Trans. N.Z. Inst.* xxxiv (1902) 395; *Cockayne Veg. N.Z.* (1921) t. 85.

CHATHAM ISLANDS: Common on rocks and sands near the shore, *F. A. D. Cox* and *Cockayne!*

A distinct species, well marked by the peculiar habit, narrow spike-like panicles, short stout pedicels, narrow awned empty glumes, and by the long-awned flowering glumes.

31. **BROMUS** Linn. 1735.

Annual or perennial grasses, of very various habit. Leaves flat, often flaceid; ligules membranous. Spikelets laterally compressed, 4- to many-flowered, arranged in a lax or contracted panicle, rarely reduced to a raceme; rhachilla disarticulating above the two outer glumes and between the flowering glumes. Two outer glumes unequal, empty, persistent, 1–7-nerved. Flowering glumes lanceolate to oblong, rounded on the back or keeled, 5–9-nerved, usually 2-toothed at the apex, awned from between the teeth or rarely from below them. Palea 2-toothed, ciliolate or scabrid on the keels. Lodicules 2, oblong or lanceolate, entire or lobed. Stamens usually 3. Ovary oblong or obovoid, furnished with a 2–3-lobed hairy cushion-like appendage at the summit; styles short, placed laterally on the appendage; stigmas plumose. Grain linear or oblong, furrowed, adherent to the palea; hilum long, narrow-linear.

Species 40 or 50, most abundant in the North Temperate Zone and in South America, rare on the high mountains of the tropics. The single indigenous species is a common Australian plant." (pas. not only in N.Z.)"

1. **B. arenarius** *Labill. Pl. Nov. Holl.* i (1806) 23, t. 28.—Annual, everywhere villous with soft spreading hairs. Culms slender, erect or ascending, sometimes geniculate near the base, leafy. Leaves 2–5 in. long, linear, flat, flaccid, withering early; sheaths close, thin, strongly striate; ligules hyaline, fimbriate at the tip. Panicle 2–6 in. long, flaccid, nodding; rhachis slender, pilose; branches in fascicles of 3–7, slender, capillary, spreading and flexuous, the longest 1½ in. long, bearing 1–3 spikelets on very slender capillary pedicels. Spikelets about ⅔ in. long without the awns, 1¼–1½ in. long with them, 4–8-flowered. Two outer glumes unequal, not ½ the length of the spikelet, villous with long hairs, acuminate, margins hyaline; the lower narrow-lanceolate, 3-nerved, but the lateral nerves often short and faint; upper oblong-lanceolate, 5–7-nerved. Flowering glumes oblong-lanceolate, thin and membranous, hyaline on the margins, strongly 7-nerved, villous, deeply 2-fid at the tip; awn as long or longer than the glume, straight, scabrid, from the back just below the notch. Palea narrow, shorter than the glume, ciliate on the keels.—*Hook. f. Fl. Nov. Zel.* i (1853) 310; *Handb. N.Z. Fl.* (1864) 341; *Benth. Fl. Austral.* vii (1878) 661; *Buch. N.Z. Grasses* (1880) t. 56A; *Cheesem. Man. N.Z. Fl.* (1906) 920. B. australis *R. Br. Prodr.* (1810) 178; *A. Cunn. Precur.* (1836) n. 358; *Raoul Choix* (1846) 39.

North Island: Rocky and sandy places near the sea, abundant from the North Cape to the East Cape and Taranaki, local farther south, rare inland, but occurring at Lake Rotorua and elsewhere. South Island: Cape Farewell, *T. Kirk!* Also not uncommon in Australia.

Several species of *Bromus* from the Northern Hemisphere are now firmly established as naturalized plants, the most abundant being *B. mollis*, a rather small species with a compact ovoid panicle and turgid spikelets; and *B. sterilis*, with a lax drooping panicle and large long-awned spikelets 2 in. long with the awns.

32. **AGROPYRUM** Gaertn.

Annual or perennial grasses. Leaves flat or convolute; ligules scarious. Spikelets more or less laterally compressed, 3- to many-flowered, solitary and sessile, distichously placed in the alternate hollows of the continuous or jointed rhachis of a simple spike, one face of the spikelet next the rhachis; rhachilla disarticulating above the two outer glumes and usually between the flowering glumes. Two outer glumes subequal or unequal, empty, persistent, lanceolate or linear. Flowering glumes more or less rigid and coriaceous, rounded on the back or keeled above, 5–7-nerved, awned or awnless. Palea rather shorter than the glume, sharply 2-keeled, ciliate on the keels. Lodicules 2, oblique or unequally lobed, entire or ciliate. Stamens 3. Ovary villous at the top; styles very short; stigmas plumose. Grain narrow, compressed at the back, often adherent to the palea; hilum as long as the grain.

Species about 35, found in almost all temperate countries, but most abundant in Europe and north Asia. Of the 4 species found in New Zealand, 1 extends to Australia, the remaining 3 are endemic.

* Awn short, never more than ½ the length of the flowering glume.

Spikelets 1 in., 6–12-flowered. Awn very short, sometimes wanting.. 1. *A. multiflorum.*

Spikelets ½ in., 2–4-flowered. Awn from ⅓ to ½ the length of the flowering glume .. .. 2. *A. aristatum.*

** Awn very long, from 3 to 5 times the length of the flowering glume.

Spikelets 1½–3 in. long with the awns; awn usually slender .. 3. *A. scabrum.*

1. **A. multiflorum**, *T. Kirk in Trans. N.Z. Inst.* xxix (1897) 530.—Perennial. Culms densely tufted, branched, decumbent or almost prostrate at the base, erect above, quite smooth and glabrous, leafy, 1–2 ft. high. Leaves 3–8 in. long, about ⅙ in. broad, flat or slightly convolute when dry, tapering from the base upwards, somewhat rigid and coriaceous, prominently striate, rough above, often glaucous; sheaths tight, pale, grooved; ligules short, truncate, membranous. Spike straight, erect, 3–6 in. long, of 6–12 spikelets; rhachis pubescent on the angles. Spikelets about 1 in. long, close or somewhat distant, erect, appressed to the rhachis, 6–12-flowered. Two outer glumes small, unequal, lanceolate, acuminate, 3–7-nerved. Flowering glumes oblong-lanceolate when spread out, convolute, smooth and rounded on the back below, scabridly keeled above, 7–9-nerved, coriaceous, acute or mucronate or produced into a short awn of varying length. Palea sharply keeled and folded, ciliolate on the keels.—*Cheesem. Man. N.Z. Fl.* (1906) 921. Triticum multiflorum *Banks and Sol. ex Hook. f. Fl. Nov. Zel.* i (1853) 311; *Handb. N.Z. Fl.* (1864) 342; *Buch. N.Z. Grasses* (1880) t. 56B. T. repens *A. Rich. Fl. Nouv. Zel.* (1832) 138; *A. Cunn. Precur.* (1836) n. 261; *Raoul Choix* (1846) 39 (*not of Linn.*).

Var. **longisetum** *Hack. MSS.*—Awn longer, sometimes half the length of the flowering glume.

North Island: Not uncommon in lowland districts throughout, especially near the coast. South Island: Queen Charlotte Sound, *Banks* and *Solander;* near Nelson, *T. F. C.;* Canterbury, *J. B. Armstrong;* Banks Peninsula, *T. Kirk.*

A variable plant in the size of the spikelets, number of flowering glumes, and the extent to which the awn is developed.

2. **A. aristatum** *Cheesem. Ill. N.Z. Fl.* ii (1914) t. 234.—Culms laxly tufted, very slender, weak, decumbent at the base, erect above, sparingly leafy, 1–2½ ft. high. Leaves much shorter than the culms, $\frac{1}{15}$–$\frac{1}{6}$ in. broad, flat, flaccid, striate, minutely rough to the touch, glabrous or sparingly villous; sheaths long, tight, softly villous or the upper ones almost glabrous; ligules short, truncate, erose. Spike 2–5 in. long, slender, erect or inclined, often interrupted below, of 9–18 spikelets; rhachis compressed, scabrid on the angles. Spikelets bluish-green, ½ in. long, 2–4-flowered. Two outer glumes about ½ the length of the spikelet, subequal, linear-lanceolate, 3–5-nerved, gradually narrowed into a scabrid acuminate point or awn ⅓–½ the length of the glume. Flowering glumes lanceolate, rounded on the back, smooth and coriaceous, 5-nerved, sometimes minutely 2-toothed at the tip, narrowed into a short scabrid awn about ⅓ the length of the glume. Palea shorter than the glume, linear-oblong, coriaceous, ciliolate on the keels.—A. Enysii *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 352; *Cheesem. Man. N.Z. Fl.* (1906) 922. Asprella aristata *Petrie in Trans. N.Z. Inst.* xxvii (1894) 272.

South Island: Canterbury—Slopes of Mount Torlesse and Broken River, *J. D. Enys! Petrie! T. F. C.;* Bealey River, *T. Kirk!* Poulter River, *Cockayne!* Southern Alps, *N. T. Carrington!* 2500–4500 ft.

A very distinct species, at once recognized by the weak habit, flat membranous leaves, narrow spike, and few-flowered spikelets. Very similar in habit to *Asperella gracilis*, and easily mistaken for it on a cursory inspection, but the structure of the spikelet is that of *Agropyrum.*

3. **A. scabrum** *Beauv. Agrost.* (1812) 102.—Annual or perennial, very variable. Culms laxly tufted, slender, decumbent at the base, erect or ascending above, quite smooth, leafy, 6–24 in. high. Leaves 2–9 in. long, $\frac{1}{20}$–$\frac{1}{10}$ in. broad, flat or convolute, usually scabrid on both surfaces, often glaucous; sheaths smooth, grooved, the upper long; ligules short, truncate. Spike 3–9 in. long, of 2–10 rather distant erect spikelets; rhachis flattened, scabrid on the angles. Spikelets ¾–1 in. long without the awns, 1½–3 in. with them, 6–12-flowered. Two outer glumes small, not reaching more than ⅓ up the flowering glumes immediately above them, subequal, narrow-lanceolate, tapering into short acuminate points, rigid, 3–5-nerved. Flowering glumes lanceolate, coriaceous, smooth and rounded on the back at the base, obscurely keeled and scabrid above, 3–5-nerved, narrowed into a long and slender straight or flexuous scabrid awn from 3 to 5 times as long as the glume itself. Palea almost as long as the glume, linear-oblong, ciliolate on the keels.—*Benth. Fl. Austral.* vii (1878) 665; *Cheesem. Man. N.Z. Fl.* (1906) 923. Triticum scabrum *R. Br. Prodr.* (1810) 178; *A. Rich. Fl. Nouv. Zel.* (1832) 137; *A. Cunn. Precur.* (1836) n. 260; *Raoul Choix* (1846) 39; *Hook. f. Fl. Nov. Zel.* i (1853) 311; *Handb. N.Z. Fl.* (1864) 342; *Buch. N.Z. Grasses* (1880) t. 57. Festuca scabra *Labill. Pl. Nov. Holl.* i (1806) 22, t. 26. Triticum Youngii *Hook. f. Handb. N.Z. Fl.* (1864) 343. Agropyrum Youngii *Cheesem. Man. N.Z. Fl.* (1906) 923.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant throughout. Sea-level to 4500 ft.

Also plentiful in Australia, from Queensland to Tasmania and West Australia. In small specimens the spike is sometimes reduced to a single terminal spikelet. Subalpine specimens usually have larger and fewer spikelets with longer awns than those from lowland districts, but the size of the spikelet and length of the awns varies excessively. I have reduced Hooker's *Triticum Youngii* to *A. scabrum*. So far as I can judge from the original description (for it has not been collected since it was discovered by Haast in 1861), it only differs from *A. scabrum* in the larger size of the spikelets and the longer and stouter awns, and, considering how variable these characters are in *A. scabrum*, I can have little doubt in transferring it to that species.

COCKAYNEA 2010. Trans 13 233
HYSTRIX Moench Meth. Pl. 294 (1794)

33. **ASPERELLA** Humb. 1790

Perennial grasses. Leaves narrow, flat. Spikelets 1- to several-flowered, 2–3 together or solitary in the alternate hollows of the rhachis of a simple slender spike, one face of the spikelet next the rhachis; rhachilla disarticulating above the two outer glumes and between the flowering glumes. Two outer glumes either wanting, or present in the lower spikelets as minute subulate bristles. Flowering glumes narrow-lanceolate, rigid, convolute, rounded on the back, 5-nerved above, produced into a short awn. Palea rather shorter than the glume, 2-keeled. Lodicules 2, obovate or dimidiate-obovate, hairy. Stamens 3. Styles short, distinct; stigmas plumose. Grain narrow-oblong, villous at the tip, grooved down the front, adherent to the palea.

A small genus of 7 species—2 in New Zealand, 2 in North America, and 1 each in the Himalayas, Japan, and Siberia.

Outer glumes often wanting. Flowering glumes more or less scabrid, distinctly 5-nerved, narrowed into an awn of varying length .. 1. *A. gracilis.*

Outer glumes always present. Flowering glumes smooth, faintly 3–5-nerved, truncately 3-toothed at the apex, the middle tooth produced into a short mucro .. .. 2. *A. laevis.*

C. (Hooker) 2

1. **A. gracilis** (*T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 352.—Perennial. Culms much branched and decumbent at the base, erect above, slender, often rather wiry, quite smooth and glabrous, leafy throughout, 1–3 ft. high. Leaves 3–9 in. long, $\frac{1}{12}$–$\frac{1}{6}$ in. broad, flat, striate, minutely scabrid on the margins and upper surface; sheaths smooth, thin, striate; ligules often obscure. Spike elongated, 3–8 in. long, very slender, of 20–40 sessile spikelets placed singly in the alternate hollows of the rhachis; rhachis compressed, flat, flexuous, ciliate on the edges. Spikelets pale-green, $\frac{1}{3}$–$\frac{2}{3}$ in. long with the awns, 1–3-flowered. Two outer glumes altogether absent or reduced to minute bristles. Flowering glumes lax, lanceolate, 5-nerved, rounded on the back below, midrib prominent above, usually more or less scabrid but sometimes nearly smooth, gradually narrowed into a scabrid awn of variable length, callus prominent. Palea almost as long as the glume, keels ciliate.—*Cheesem. Man. N.Z. Fl.* (1906) 924. Gymnostichum gracile *Hook. f. Fl. Nov. Zel.* i (1853) 312, t. 70; *Handb. N.Z. Fl.* (1864) 343; *Buch. N.Z. Grasses* (1880) t. 58.

NORTH AND SOUTH ISLANDS: Auckland—Kaitaia, *H. B. Matthews!* Te Pahi, Kaipara, *T. Kirk!* Thames, *Adams! T. F. C.*; Te Aroha, *Adams!* Rotorua, *T. F. C.*; East Cape district, *Adams* and *Petrie*. Hawke's Bay—Tarawera, Dannevirke, *Colenso!* Turangarere, *Petrie*. Wellington—*Buchanan*. Nelson—Lower Motueka, Graham River, *T. F. C.* Canterbury—Akaroa, *Raoul, J. B. Armstrong*; Mount Peel, *H. H. Allan*; Mount Cook district, *T. F. C.* Otago—Not uncommon in lowland districts, *Buchanan! Petrie!* Sea-level to 3000 ft. see Petrie Trans 13 : 332

2. **A. laevis** (*Petrie*) *in Trans. N.Z. Inst.* xxvii (1895) 406.—Culms branched from the base, slender, erect or diffuse, sparingly leafy, 10–30 in. high. Leaves 3–9 in. long, $\frac{1}{15}$–$\frac{1}{8}$ in. broad, flat or involute, striate, smooth or nearly so; sheaths smooth or puberulous; ligules short. Spike 3–6 in. long, slender, of 15–30 spikelets; rhachis flat, flexuous, scabrid on the edges. Spikelets pale-green, about $\frac{1}{3}$ in. long, 1-2-flowered. Two outer glumes always present, reduced to linear-subulate bristles about $\frac{3}{4}$ the length of the lower flowering glume, subequal, erect, channelled, scabrid. Flowering glumes lanceolate, faintly 3–5-nerved, rounded on the back, quite smooth, unequally 3-toothed at the apex, the middle tooth produced into a short scabrid mucro. Palea rather shorter than the glume, keels smooth or minutely ciliolate.—*Cheesem. Man N.Z. Fl.* (1906) 924.

SOUTH ISLAND: Nelson—Clarence Valley, *T. Kirk!* Otago—Matukituki Valley, Catlin's River, *Petrie!* Waikawa, *H. J. Matthews!* Doubtful Sound, *B. C. Aston!* Sea-level to 2000 ft.

Very close to *A. gracilis*, from which it differs in the two outer glumes being always present, and in the flowering glumes being smooth, obscurely nerved, and truncately 3-toothed at the apex, the middle tooth being produced into a short stout mucro. Further observation is required to prove the constancy of these characters.

Family XII. CYPERACEAE.

Grassy or rush-like herbs, usually perennial. Stems solid or rarely slightly hollow, often trigonous, sometimes compressed or terete. Leaves alternate, mostly radical, few or many, sometimes wanting or reduced to sheathing scales; sheaths closed, not split to the base. Flowers hermaphrodite or unisexual, minute, solitary and sessile in the axils of small imbricated bracts (glumes), which are aggregated into few- or many-flowered (rarely 1-flowered) spikelets. Spikelets either solitary and terminal, or arranged in spikes, racemes, panicles, or clusters. Glumes rigid or scarious or membranous, concave, distichous or imbricated all round, persistent or deciduous, 1 or 2 (rarely more) at the base of each spikelet empty. Perianth wanting or represented by few hypogynous bristles or scales. Stamens 1–3, rarely 4–6, hypogynous; filaments linear, flat, often elongating after flowering; anthers usually exserted from the spikelet and pendulous, linear, basifixed, 2-celled. Ovary entire, 1-celled, in *Carex* and its allies enclosed in a peculiar flask-shaped organ called the utricle or perigynium formed of 1 or 2 modified bracteoles; style short or long, 2–3-cleft, divisions stigmatic on the inner side; ovule solitary, basal, erect, anatropous. Fruit a small indehiscent nut (in *Carex* enclosed in the utricle), lenticular or compressed or more often trigonous. Seed erect; testa membranous; albumen farinaceous; embryo minute, at the very base of the albumen.

A very large family, found in all parts of the world, both temperate and tropical, and in almost all stations, but most abundant in marshes, or by the margins of lakes and rivers. It is closely allied to grasses, being chiefly distinguished by the stiffer habit, solid and usually angled or compressed stems, entire leaf-sheaths, basifixed anthers, undivided (not plumose) stigmas, and by the position of the embryo. Genera 68; species estimated at 3500. Notwithstanding the extent of the order, it is of little economic importance. The herbage is too coarse and harsh, and too deficient in nutritive properties, to be serviceable as food for cattle; and the seed is useless. The tuberous roots of certain species of *Scirpus* and *Cyperus* contain starch, and have been used as food, while in others they are bitter, tonic, and stimulating, and have been employed in medicine. Many species are serviceable for paper-making, or in the

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the utricle .. .. 14. CAREX.

CYPERACEAE: Acc. to Hutchinson.

1. Utricle present, Fls. unisexual - Cariceae 2
   Utricle absent, fls. hermaphrodite . . . 3
2. Rachilla hooked . . . . . Uncinia
   Rachilla not hooked . . . . . Carex
3. Spikelets very few-fld. mostly 2-fld.; often 2 or more of lowest glumes empty - Rhyncosporeae 4
   Spikelets several to many-fld.; only 1 or rarely 2 of the lowest glumes empty . . .10
4. Hypogynous scales of 6 perianth-like sgmts. . . . . ovobolus
   Hyp. scales modified into setae, or thin, or absent 5
5. Hypogynous setae absent 6
   Hypogynous setae present 7
6. Style not swollen at base . . . . . gahnia
   Style swollen at base . . (Schoenus)cladium
7. Hypogynous setae plumose . . . . . carpha
   Hypogynous setae not plumose 8
8. Glumes not distichous . . . . . cladium
   Glumes distichous 9
9. Rachilla flexuous and produced between the fls., or above the perfect flower .schoenus
   Rachilla not as above, seta accrescent . . . . . Lepidosperma
10. Glumes distichous - Cypereae 11
    Glumes not distichous - Scirpeae 13
11. Rochella persistent . . . . . cyperus
    Rochilla deciduous 12
12. Style 3-branched . . . . . mariscus
    Style 2-branched . . . . . kyllinga
13. Hypogynous scales & setae absent . . . . . Fimbristylis
    Hypogynous scale or setae present 14
14. Stem leafless, lower bract glume-like . . . . . Eleocharis
    Stems leafy at base, lower bract not glume-like . . . . . scirpus

RHACHILLA ?

SCIRPUS

used as food, while in others they are bitter, tonic, and stimulating, and have been employed in medicine. Many species are serviceable for paper-making, or in the

fabrication of mats, baskets, &c. The paper of the ancients was manufactured from the well-known *Papyrus*, a plant common along the Nile and in other parts of tropical Africa. Of the 14 genera found in New Zealand 9 are either cosmopolitan or very widely distributed; 2 (*Carpha* and *Oreobolus*) are confined to Australia and South America; *Uncinia* has a similar range, but extends northwards to the Sandwich Islands, Mexico, and the West Indies; the 2 remaining (*Lepidosperma* and *Gahnia*) are mainly Australian, but reach as far north as Malaya and China.

In the first edition of this work I received great assistance from the late Mr. C. B. Clarke, who had an unrivalled knowledge of the family. He not only supplied me with full information and critical notes respecting the New Zealand species, but also provided me with a list of the synonymy of the species, which proved to be of the greatest possible use, and which I have again consulted, with much profit, during the present rearrangement. I have also to acknowledge the great help derived from Pastor Kukenthal's recent revision of the genera *Uncinia* and *Carex*, given in Heft 30 of Engler's Pflanzenreich.

Tribe CYPEREAE.—Spikelets usually many-flowered, flat or compressed. Glumes distichous, imbricate, lower 1–2 empty. Flowers hermaphrodite or the upper 1–2 male by arrest. Hypogynous bristles absent.

Spikelets small, 1- or rarely 2-flowered, clustered in a simple or lobed head. Style 2-fid .. .. 1. KYLLINGA.
Spikelets many-flowered; glumes falling away from the persistent rhachilla. Style 3-fid .. .. 2. CYPERUS.
Spikelets many-flowered; glumes persistent, the rhachilla finally coming away above the 2 lowest. Style 3-fid .. .. 3. MARISCUS.

Tribe SCIRPEAE.—Spikelets usually many-flowered, terete. Glumes spirally arranged, lower 1–2 empty. Flowers hermaphrodite or the upper 1–2 male. Hypogynous bristles often present.

Leafless. Spikelet solitary, terminal. Nut crowned by the persistent thickened base of the style. Hypogynous bristles present .. .. 4. ELEOCHARIS.
Leaves radical. Spikelets umbellate. Style bulbous at the base, usually deciduous. Hypogynous bristles wanting .. .. 5. FIMBRISTYLIS.
Spikelets few or many, fascicled or umbelled. Style not thickened at the base, continuous with the nut. Hypogynous bristles present or wanting .. .. 6. SCIRPUS.

Tribe RHYNCHOSPOREAE.—Spikelets 1- or few-flowered, terete or compressed. Glumes spirally arranged, several (usually more than 2) of the lower ones empty. Hermaphrodite flowers 1 or 2; the remainder male or imperfect.

Alpine, leafy at the base. Spikelets in a terminal corymb, compressed, pale, 1-flowered; glumes 4, distichous. Hypogynous bristles long, plumose .. .. 7. CARPHA.
Spikelets few-flowered, compressed; glumes several, distichous. Rhachilla often elongated and flexuose between the flowers .. 8. SCHOENUS.
Spikelets 1–7-flowered, lowest flower alone hermaphrodite; glumes not distichous. Stamens 3, rarely elongating. Hypogynous bristles wanting.. .. .. 9. CLADIUM.
Spikelets 1–3-flowered, upper flower alone hermaphrodite. Stamens 3, rarely elongating. Hypogynous bristles present .. 10. LEPIDOSPERMA.
Tall, harsh and grassy. Spikelets 1–3-flowered, upper flower alone hermaphrodite. Stamens 3–6, usually elongating in fruit and holding the nut. Hypogynous bristles wanting .. 11. GAHNIA.
Dwarf alpine plants forming dense cushions in bogs. Spikelets solitary or 2–3 together, 1-flowered; glumes 3. Hypogynous scales (perianth) 6, persistent .. .. 12. OREOBOLUS.

Tribe CARICEAE.—Spikelets monoecious, the male and female flowers in the same or in distinct spikelets; rarely dioecious. Nuts enclosed in an entire or 2-fid inflated sac (utricle).

Spikelet solitary, androgynous. Rhachilla produced beyond the utricle into a hooked bristle .. .. 13. UNCINIA.
Spikelet solitary, or more often clustered or spicate or panicled, androgynous or unisexual. Rhachilla not produced beyond the utricle .. .. 14. CAREX.

1. KYLLINGA Rottb. 1773.

Stems slender, simple, erect, leafy at the base. Spikelets small, numerous, compressed, 1–3-flowered, densely crowded in 1–3 ovoid or cylindric terminal heads or spikes subtended by 2–6 unequal linear leaf-like bracts. Glumes 4–7, distichous; the two lowest small, empty; the next, or rarely the two next, hermaphrodite and fruit-bearing; the upper ones male or the uppermost smaller and empty; in fruit the rhachilla falls away above the two lowest glumes. Hypogynous scales wanting. Stamens 1–3. Style continuous with the ovary, not thickened at the base; branches 2, filiform. Nut laterally compressed, smooth.

A genus of about 50 species, widely spread through the warmer regions of both hemispheres, but not found in Europe.

1. **K. brevifolia** *Rottb. Desc. et Ic.* (1773) t. 4, f. 3.—Rhizome creeping, elongate. Stems numerous from the rhizome, slender, 4–12 in. high or more. Leaves flat, grassy, usually shorter than the stems, $\frac{1}{10}$–$\frac{1}{6}$ in. broad. Bracts usually 3, spreading, similar to the leaves. Spikes solitary or rarely 2–3 together, broadly ovoid, greenish, $\frac{1}{5}$–$\frac{1}{3}$ in. long. Spikelets about $\frac{1}{8}$ in.; fertile flower usually solitary. Glume of fertile flower ovate, mucronate, eglandular, keeled; keel not winged above, 3-nerved; sides of glume with 3–4 striae. Stamens 2. Nut ellipsoid, pale yellow-brown, about $\frac{1}{2}$ as long as the glume.—*C. B. Clarke in Hook. f. Fl. Brit. Ind.* vi (1893) 588; *Ill. Cyp.* t. i, f. 1–4; *Cheesem. Man. N.Z. Fl.* (1906) 764. K. monocephala *Cheesem. in Trans. N.Z. Inst.* xi (1879) 434 (*not of Rottb.*).

Common in most warm countries, and possibly only naturalized in New Zealand. It is very closely allied to the equally abundant *K. monocephala*, to which I formerly referred it, but which can be distinguished by the glume of the fertile flower having the upper part of the keel winged or crested and more or less glandular.

Kermadec Islands: *W. R. B. Oliver!* North Island: From Ahipara and Mangonui northwards to the North Cape, *W. T. Ball! T. F. C., H. Carse!* Also naturalized near the North Manukau Head.

2. CYPERUS Linn. 1735.

Annual or more commonly perennial herbs. Stems erect, simple below the inflorescence. Leaves at the base of the stem, usually long, the lowest sometimes reduced to sheaths. Inflorescence umbellate or capitate, often large and compound; bracts at the base long, leaf-like, spreading. Spikelets oblong or linear, compressed; rhachilla persistent. Glumes usually many, distichous; the two lowest empty; four at least and generally many of the succeeding ones hermaphrodite and fruit-bearing, falling away from the rhachilla one by one, commencing with the lowest; the uppermost 1–3 sterile or empty. Stamens 2–3, rarely 1. Style continuous with the ovary, not thickened at the base; branches 3, filiform. Nut triquetrous or plano-convex, the flat face against the rhachilla, surface smooth.

A large genus of over 375 species, most abundant in the tropical and subtropical districts of both hemispheres, comparatively rare in temperate regions. The two New Zealand species are widely distributed; one of them is certainly a recent introduction, and possibly the other as well.

Small, 1–3 in. high. Inflorescence of a single head; spikelets 1–3 . . . . . 1. *C. tenellus.*
Tall, 1–2 ft. high. Inflorescence in a compound umbel; spikelets very numerous . . . . . 2. *C. vegetus.*

The tropical *C. rotundus* Linn., easily recognized by the black ovoid tubers on the creeping stolons, and hence frequently known by the name of "nut-grass," has become naturalized in the vicinity of Auckland. It is a most pernicious weed.

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vol. 57, p. 63. (Ckn. & Allan).

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See Kirk 1942. 42: 77. H. O'Neill.

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Species about 180, found in all tropical and subtropical regions, but not extending into Europe. The single New Zealand species is endemic.

(A. Rich.)

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A common South African plant, doubtfully indigenous in temperate Australia and New Zealand.

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perhaps not native to N.Z. see T.N.Z.I.

vol. 57, p. 63. (Ckn. & Allan).

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North Island: Auckland—Oruru and Oruaiti Valleys, near Mangonui, *T. F. C.* Wellington—Lower Hutt, Waiwetu, Wainuiomata, Greytown, *Buchanan! T. Kirk!* Tararua Mountains, Cape Turakirae, *B. C. Aston!* November–January.

The true home of this plant, as has been pointed out by Mr. C. B. Clarke (Journ. Bot. 1897, 71) is in temperate South America, and there can be no doubt that it exists only as an introduced species in New Zealand, as also in many localities in southern Europe, the Azores, North America, Tahiti, &c. I retain it in the Flora because it has been twice described as an indigenous species, and on account of the remarkable fact that wherever found it presents all the appearance of a true native, and would certainly be taken as such by any one unacquainted with its origin.

See Rhodora 1942. 44: 77. A. O'Neill.

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See H. K. Svenson Monographic studies (H.) in genus Eleocharis Rhodora 31: 1929

4. ELEOCHARIS R. Br. 1810.

Stems simple, erect, without perfect leaves. Sheaths few, the uppermost cylindric, truncate or produced on one side into a short tooth. Inflorescence a single terminal many-flowered terete spikelet. Glumes many, imbricate all round the rhachis; the lowest 1 or 2 empty, shorter than the spikelet; many succeeding ones hermaphrodite and fruit-bearing; the uppermost male or sterile. Hypogynous bristles usually 6, but varying from 3 to 8, rarely absent. Stamens 3 or fewer. Style swollen at the base; branches 3 or 2, linear. Nut obovoid, trigonous or plano-convex.

Species estimated at 100, distributed over the whole world, but most numerous in America. Of the 5 found in New Zealand, 2 are endemic, 2 extend to Australia, the remaining one is almost cosmopolitan.

A. Limnochloa. *Stem stout, spikelet large, hardly wider than the stem. Glumes subrigid.*

Stems stout, septate. Spikelet 1–2 in. long .. .. .. 1. *E. sphacelata.*

B. Eleogenus. *Stem slender. Spikelets small, broader than the stem. Glumes membranous. Style 2-fid.*

Stems short, 1–2$\frac{1}{2}$ in. Spikelet $\frac{1}{6}$–$\frac{1}{4}$ in. .. .. .. 2. *E. neo-zealandica.*

C. Eu-Eleocharis. *Stem slender. Spikelet small, broader than the stem. Glumes membranous. Style 3-fid.*

Stems 2–6 in., filiform. Spikelets $\frac{1}{8}$–$\frac{1}{5}$ in., compressed. Nut longitudinally ribbed and transversely striate .. .. .. 3. *E. acicularis.*
Stems 4–18 in., rather stout. Leaf-sheath truncate with an erect mucro. Spikelet $\frac{1}{4}$–$\frac{3}{4}$ in. Nut smooth .. .. .. 4. *E. acuta.*
Stems 3–15 in., very slender. Leaf-sheath oblique, acute. Spikelet $\frac{1}{8}$–$\frac{1}{4}$ in. Nut smooth .. .. 5. *E. Cunninghamii.*

1. **E. sphacelata** *R. Br. Prodr.* (1810) 224.—Rhizome stout, creeping, stoloniferous. Stems stout, cylindrical, 1–3 ft. high, $\frac{1}{3}$ in. diam., hollow, transversely septate; sheaths long, membranous. Spikelet very large, 1–2 in. long, $\frac{1}{3}$ in. diam., solitary, terminal, cylindrical, pale-coloured, tip acute. Glumes numerous, very closely imbricate, obovate-oblong, obtuse, 1-nerved, membranous, pale with a brown line just inside the scarious margin. Hypogynous bristles 6–9, usually exceeding the nut, retrorsely scabrid. Style very long, branches 3. Nut broadly obovoid, compressed,

minutely granular, pale, crowned with the persistent dark-brown conic swollen base of the style.—*A. Cunn. Precur.* (1836) n. 277; *Raoul Choix* (1846) 40; *Hook. f. Fl. Nov. Zel.* i (1853) 269; *Handb. N.Z. Fl.* (1864) 300; *Benth. Fl. Austral.* vii (1878) 292 (Heleocharis); *Cheesem. Man. N.Z. Fl.* (1906) 767; *C. B. Clarke Ill. Cyp.* (1909) t. xxxiv, f. 1–6.

North Island: Wet swamps and margins of lakes, not uncommon at low altitudes. South Island: Nelson—Takaka, *T. Kirk!* Canterbury—*J. B. Armstrong.* Westland—Okarito, *A. Hamilton!* Southland—Bluff Island, *Lyall.* Stewart Island: Head of Paterson's Inlet, *Petrie!* swamps from Fresh-water Valley to Mason Bay, *Cockayne.* Sea-level to 1500 ft. December–February.

An abundant Australian and Tasmanian plant, and very closely allied to the widely diffused *E. plantaginea* R. Br.

2. **E. neo-zealandica** *C. B. Clarke ex T. Kirk in Trans. N.Z. Inst.* xxxi (1894) 260.—Rhizome slender, creeping, 1–3 in. long. Stems short, 1–2½ in. high, striate; sheath membranous, mouth oblique. Spikelet solitary, terminal, ⅙–¼ in. long, broadly ovoid, much wider than the stem, 4–8-flowered. Glumes broadly ovate, concave, obtuse, red-brown with a paler centre and scarious margins. Hypogynous bristles wanting. Stamens 3. Style with 2 linear arms and a very small swollen base. Nut obovoid, biconvex, smooth, pale-brown.—*Cheesem. Man. N.Z. Fl.* (1906) 768; *C. B. Clarke Ill. Cyp.* (1909) t. xxxvi, f. 10–14.

North Island: Auckland—Sand-dunes between Cape Maria van Diemen and Ahipara, *T. F. C., H. Carse!* South Island: Nelson—Cape Farewell, *T. Kirk!*

A curious little species, belonging to the section *Eleogenus*, characterized by the spikelets broader than the slender stems, membranous glumes, and 2-fid style. Mr. Clarke remarks that it approaches the section *Isolepis* of *Scirpus* in the absence of hypogynous bristles and the reduced

margins and keel sharply and minutely serrulate. Inflorescence a large terminal umbel often more than 6 in. diam.; rays 6–10, each bearing an oblong spike 1–2 in. long of very numerous red-brown spikelets; bracts numerous, forming an involucre at the base of the umbel, very long and leafy, the lowest frequently over 2 ft. Spikelets linear-lanceolate, $\frac{1}{3}$–1 in. long, 5–20-flowered. Glumes distichous, ovate-oblong, obtuse or mucronate, smooth and shining, grooved. Stamens 3. Nut linear-oblong, trigonous; style-branches 3.—*Cheesem. Man. N.Z. Fl.* (1906) 766. Cyperus ustulatus *A. Rich. Fl. Nouv. Zel.* (1832) 101, t. 17; *A. Cunn. Precur.* (1836) n. 270; *Raoul Choix* (1846) 40; *Hook. f. Fl. Nov. Zel.* i (1853) 268; *Handb. N.Z. Fl.* (1864) 297.

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See Blake, Proc. Roy. Soc. Canad. 50: 95-132.

A. ELEOCHARIS (after Blake)

St

B. 1. Glumes hardened, many-nerved - sphacelata
2. Glumes membranous, uninerved - 2.

St 2. Style 2-fid, orifice of sheath not mucronate
C. - neozelandica.
Style 3-fid, or if 2-fid, then orifice of
St sheath mucronate - 3.
St 3. Nuts obscurely trigonous - pusilla.
St Nuts distinctly trigonous or plano-convex - 4
4. Dorsal angles of nut ribbed - gracilis.
Dorsal angles of nut not rubbed - acuta.

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E. subsphacelata Shend. 1855, p.317.

minutely granular, pale, crowned with the persistent dark-brown conic swollen base of the style.—*A. Cunn. Precur.* (1836) n. 277; *Raoul Choix* (1846) 40; *Hook. f. Fl. Nov. Zel.* i (1853) 269; *Handb. N.Z. Fl.* (1864) 300; *Benth. Fl. Austral.* vii (1878) 292 (Heleocharis); *Cheesem. Man. N.Z. Fl.* (1906) 767; *C. B. Clarke Ill. Cyp.* (1909) t. xxxiv, f. 1–6.

North Island: Wet swamps and margins of lakes, not uncommon at low altitudes. South Island: Nelson—Takaka, *T. Kirk!* Canterbury—*J. B. Armstrong.* Westland—Okarito, *A. Hamilton!* Southland—Bluff Island, *Lyall.* Stewart Island: Head of Paterson's Inlet, *Petrie!* swamps from Fresh-water Valley to Mason Bay, *Cockayne.* Sea-level to 1500 ft. December–February.

An abundant Australian and Tasmanian plant, and very closely allied to the widely diffused *E. plantaginea* R. Br.

2. **E. neo-zealandica** *C. B. Clarke ex T. Kirk in Trans. N.Z. Inst.* xxxi (1894) 260.—Rhizome slender, creeping, 1–3 in. long. Stems short, 1–2½ in. high, striate; sheath membranous, mouth oblique. Spikelet solitary, terminal, ⅙–¼ in. long, broadly ovoid, much wider than the stem, 4–8-flowered. Glumes broadly ovate, concave, obtuse, red-brown with a paler centre and scarious margins. Hypogynous bristles wanting. Stamens 3. Style with 2 linear arms and a very small swollen base. Nut obovoid, biconvex, smooth, pale-brown.—*Cheesem. Man. N.Z. Fl.* (1906) 768; *C. B. Clarke Ill. Cyp.* (1909) t. xxxvi, f. 10–14.

North Island: Auckland—Sand-dunes between Cape Maria van Diemen and Ahipara, *T. F. C., H. Carse!* South Island: Nelson—Cape Farewell, *T. Kirk!*

A curious little species, belonging to the section *Eleogenus*, characterized by the spikelets broader than the slender stems, membranous glumes, and 2-fid style. Mr. Clarke remarks that it approaches the section *Isolepis* of *Scirpus* in the absence of hypogynous bristles and the reduced size of the swollen base of the style.

3. **E. acicularis** *R. Br. Prodr.* (1810) 224.—Rhizome very slender, almost filiform, creeping, stoloniferous. Stems numerous, tufted, extremely slender, capillary, 2–6 in. high; sheaths membranous, acute. Spikelet small, slender, ⅛–⅕ in. long, compressed, pale to dark-brown, 3–6-flowered. Glumes ovate, obtuse, membranous, brown with a greenish or pale centre and narrow scarious margins. Hypogynous bristles 2–4, short, deciduous. Style-branches 3; style-base small, conic, depressed. Nut small, pale, obovoid-oblong, longitudinally ribbed and with minute transverse striae between the ribs.—*Kunth Enum.* ii (1833) 141; *C. B. Clarke in Hook. f. Fl. Brit. Ind.* vi (1893) 628.

South Island: Otago—Lake Te Anau, *Petrie!* (No. 1647).

I have seen no specimens but Mr. Petrie's, which are in young flower only. Mr. C. B. Clarke, who has examined them, states that he is satisfied that they belong to the small group consisting of *E. acicularis* and a very few closely allied species, and most probably to *E. acicularis* itself, which is an almost cosmopolitan plant, although not yet recorded from Australia.

4. **E. acuta** *R. Br. Prodr.* (1810) 224.—Rhizome creeping. Stems numerous, tufted, 4–18 in. high, rather stout or slender, striate; sheath closely appressed to the stem, with a horizontally truncate mouth, the margin of which is thickened and usually dark-coloured, with a small erect mucro or rudimentary lamina on one side. Spikelet variable in length, ¼–¾ in. or more, linear-oblong, cylindric, obtuse or subacute, many-flowered. Glumes broadly ovate, obtuse, membranous, concave, brown with usually a pale line down the centre; margins broad, scarious. Hypogynous scales

4–8, exceeding the nut. Stamens 3. Style-branches 3. Nut broadly obovoid, biconvex, smooth or very minutely pitted, brown, crowned by the small conic style-base.—*Hook. f. Handb. N.Z. Fl.* (1864) 745; *Benth. Fl. Austral.* vii (1878) 294 (Heleocharis); *Cheesem. Man. N.Z. Fl.* (1906) 768. E. gracilis (*excl. var.* b *and* y) *Hook. f. Fl. Nov. Zel.* i (1853) 270; *Handb. N.Z. Fl.* (1864) 301. E. ambigua *T. Kirk ex Buch. in Trans. N.Z. Inst.* vi (1874) 225.

Kermadec Islands: *W. R. B. Oliver!* North and South Islands, Chatham Islands: Abundant in wet places from the North Cape to Foveaux Strait. Stewart Island: *Cockayne.* Sea-level to 3500 ft. November–March.

Also plentiful in Australia, Tasmania, and Norfolk Island.

5. **E. Cunninghamii** *Boeck. in Flora*, xli (1858) 412 (Heleocharis).—Rhizome long, creeping, scaly, stout or slender, dark red-brown or almost black. Stems many from the rhizome, variable in length, 3–15 in., very slender, sometimes almost filiform, striate; sheath membranous, with a thin oblique mouth. Spikelet small, short, $\frac{1}{8}$–$\frac{1}{4}$ in. long, broadly ovoid, subacute, 5–20-flowered. Glumes broadly oblong, obtuse, membranous, usually pale but often stained with red-brown; margins broad, scarious. Hypogynous bristles 4–8, exceeding the nut. Style-branches 3. Nut broadly obovoid, plano-convex or obscurely trigonous, smooth, pale yellowish-brown, crowned by the small pyramidal style-base, which is rather broader than the top of the nut.—*Linnaea*, xxxvi (1869–70) 427; *Cheesem. Man. N.Z. Fl.* (1906) 769. E. gracilis *var.* gracillima *and var.* radicans *Hook. f. Fl. Nov. Zel.* i (1853) 270; *Handb. N.Z. Fl.* (1864) 301 (*not of R. Br.*). E. gracillima *Hook. f. Handb. N.Z. Fl.* (1864) 745. Heleocharis Hookeri *Boeck. in Linnaea*, xxxvi (1869–70) 430. Isolepis acicularis *A. Rich. Fl. Nouv. Zel.* (1832) 103 (*not of R. Br.*).

North and South Islands.—Wet places from the North Cape to Foveaux Strait, but often local in the South Island. Stewart Island: Swampy ground, *Cockayne!* Sea-level to 4500 ft. November–March.

Hooker's two varieties *gracillima* and *radicans*, originally published as forms of the Australian *E. gracilis*, only differ in size and degree of development, *radicans* being clearly a depauperated state. In many localities they can be seen to merge into one another. Boeckeler, probably working upon scanty herbarium material, treated them as distinct species, publishing his *E. Cunninghamii*, which answers to var. *radicans*, in 1858, and *E. Hookeri*, which is equivalent to var. *gracillima*, in 1869. *E Cunninghamii* has several years' priority over Hooker's *gracillima*, which was not published until 1867, but it is unfortunate that it was not originally applied to what must be considered the type of the species, Hooker's var. *gracillima*.

5. **FIMBRISTYLIS** Vahl.

Annual or perennial tufted herbs, usually of small or medium size. Leaves from near the base of the stem, grassy or filiform. Inflorescence a terminal simple or compound umbel, or reduced to a solitary terminal spikelet. Spikelets many-flowered. Glumes imbricate all round or rarely distichous; the lowest 1–2 empty; the remainder all hermaphrodite, or the uppermost male or sterile. Hypogynous bristles wanting. Stamens 3, more rarely 2 or 1. Style often hairy or ciliate, with a bulbiform or conic base, deciduous; style-branches 3 or 2. Not obovoid, trigonous or biconvex, often narrowed at the base.

A large genus of about 140 species, found in all tropical or warm temperate regions.

SCIRPUS

ADDITIONS and REVISIONS

Transactions Vol.76.part 4. page 567. V.J.Cook.

Scirpus caldwellii sp. nov.

S. medianus " "

S. perviridis " "

S. maritimus and varieties macrostachya & fluviatilis do not occur in N.Z.

Transactions Vol. 81.part 2.page 157. V.J.Cook.

Scirpus crassiusculus replaces S. lenticularis

S. pottsii sp.nov.

S. caligenis " "

S. caligenis var. tristigmatosa sp. nov.

S. antipodus sp. nov.

S. reticularis Col. restored. Key given.

S. antarcticus does not occur in N.Z.

S. sulcatus var. distigmatosa Key given.

S. inundatus Key given.

S. merrillii (been confused with S.aucklandicus & S.inundatus)

S. setaceus L. spread of:

S. aucklandicus remarks on:

S. prolifer " "

S. nodosus " "

S. basilaris " "

var

1. **F. squarrosa** *Vahl. Enum.* ii (1806) 289.—A slender more or less pubescent annual 2–8 in. high; stems numerous, tufted, striate. Leaves linear, setaceous, shorter than the stems. Umbel terminal, usually compound, 1–3 in. diam.; rays slender, unequal, 1–2 in. long; bracts 3–4, similar to the leaves, often exceeding the umbel. Spikelets numerous, on slender pedicels, $\frac{1}{6}$–$\frac{1}{5}$ in. long, narrow-ovoid, brownish. Glumes elliptic-lanceolate, acuminate, keeled, 3-nerved, more or less squarrose. Stamens 1 or 2. Style pubescent, the bulbiform base with numerous long hairs which hang over the nut and are closely appressed to it; style-branches 2. Nut about $\frac{1}{3}$ the length of the glume, obovoid-oblong, biconvex, pale-yellow, smooth.

Var. **velata** *C. B. Clarke.*—Nerves of the glumes almost fused into a solid keel, the excurrent tip not nearly so squarrose.—F. velata *R. Br. Prodr.* (1810) 227; *Hook. f. Fl. Nov. Zel.* i (1853) 272; *Benth. Fl. Austral.* vii (1878) 309. F. dichotoma *Hook. f. Handb. N.Z. Fl.* (1864) 303 (*not of Vahl.*).

North Island: Auckland—Bay of Islands, *Colenso!* near Auckland (?), *Sinclair;* Port Waikato, *T. Kirk!* hot springs at Ohinemutu, Lake Rotorua, *T. Kirk! T. F. C.;* Lake Rotomahana, *Filhol.* Sea-level to 1000 ft. December-February.

The typical form of the species is found in most warm countries; the var. *velata* is restricted to eastern Australia and New Zealand.

6. **SCIRPUS** Linn. 1735

Glabrous annual or perennial herbs of very various habit, small and tufted, or tall and stout with a creeping rhizome. Leaves usually from near the base of the stem, long or short, sometimes reduced to appressed sheaths. Spikelets usually many-flowered, solitary or fascicled, or more numerous and umbellate or panicled. Glumes imbricate all round the rhachis; lowest 1 or 2 empty; several or many succeeding ones hermaphrodite and fruit-bearing; the uppermost sterile. Hypogynous bristles 3–8 or wanting. Stamens 3 or fewer. Style long or short, passing gradually into the nut; style-branches 2 or 3. Nut obovoid or broadly oblong, trigonous or plano-convex, sessile or nearly so.

A somewhat heterogeneous assemblage of about 145 species, found in all parts of the world, both tropical and temperate. Of the 13 species found in New Zealand, 4 are generally distributed in both the Northern and Southern Hemispheres; 6 extend to Australia, 3 of them reaching South Africa as well; 1 is found in Tristan d'Acunha; the remaining 2 are endemic. The student will find it a difficult and perplexing task to discriminate between several of the species of the first section.

Isolepis R. Br. Prodr. 221 1810

Section I. Isolepis. *Usually small and slender plants. Spikelets in clusters or solitary. Hypogynous bristles wanting.*

* Spikelets solitary or 2–3 in a head.

Stems long, slender, often much branched and floating. Spikelet solitary. Style-branches 2. Nut biconvex, white	1. *S. lenticularis.*
Stems very short, $\frac{1}{8}$–$\frac{1}{2}$ in. long, leafy. Spikelets usually solitary, concealed by the leaves. Style-branches 2. Nut biconvex, brown	2. *S. basilaris.*
Stems 1–6 in., branched below. Leaves several, equalling the stems. Spikelets 1–2. Style-branches 3. Nut obovoid, obtusely trigonous, white	3. *S. Aucklandicus.*
Stems 2–6 in. Leaves 1–2, shorter than the stems. Spikelets 1–3. Style-branches 3. Nut obovoid, obtusely trigonous	4. *S. cernuus.*

S. fluitans see Carse Trans 57:1926:89.
S. Carsei Kirk. et Carse.

** Spikelets usually more than 3 in a cluster (sometimes reduced to 1 in small states of *S. antarcticus* and *S. inundatus*).

Stems ½–6 in. Leaves 1–3, often rigid and cartilaginous. Spikelets 1–9; glumes rigid, keeled, grooved on the sides. Stamens 3. Style-branches 3. Nut acutely trigonous, yellow to dark-brown 5. *S. antarcticus.*

Stems 2–12 in., usually slender and flaccid. Leaves 1–2 or wanting. Heads often proliferous; spikelets 2–15. Stamen 1. Style-branches 3. Nut acutely trigonous, white .. .. .. 6. *S. inundatus.*

Stems 8–16 in., rather stout, leafless. Spikelets 6–20, short, oblong. Stamen usually 1. Style-branches 2. Nut plano-convex, smooth and polished, pale .. .. 7. *S. sulcatus.*

Stems 1–2 ft., rather stout, flaccid, leafless. Spikelets 10–30, long, linear. Stamens 3. Style-branches 3. Nut acutely trigonous.. 8. *S. prolifer.*

Stems 1–3 ft., stout, rigid, erect, leafless. Spikelets numerous, short, ovoid, crowded. Stamens 3. Style-branches 3. Nut obtusely trigonous, brown .. .. 9. *S. nodosus.*

Hk.f. Fl. N.Z. i 271 : 1853

Section II. Desmoschoenus. *Tall, harsh, rigid and coriaceous. Spikelets numerous, spirally arranged around the upper part of the stem. Hypogynous bristles wanting.*

Rhizome long. Stems 1-3 ft. Leaves numerous, subsquarrose .. 10. *S. frondosus.*

Section III. Eu-Scirpus. *Usually large. Stem leafy at the base or leaves wanting. Spikelets usually panicled or umbelled, rarely in heads or solitary. Hypogynous bristles present.*

Stems acutely trigonous, 1–2 ft. high. Leaves 1–4, trigonous, shorter than the stem. Spikelets few, crowded into a small head 11. *S. americanus.*

Stems terete, spongy, leafless, 2–6 ft. high. Spikelets in a broad panicle or umbel 2–4 in. diam. .. .. 12. *S. lacustris.*

Stems acutely trigonous, 1–5 ft. high. Leaves longer than the stems, broad, flat. Spikelets in a terminal umbel; involucral bracts long, leafy.. .. .. 13. *S. maritimus.*

S. lac.

1. **S. lenticularis** *Poir. Encyc. Suppl.* v (1817) 103.—Stems slender, in very wet places 6–18 in. long, elongated and much branched, putting out a small tuft of leaves at each node, often forming large floating masses; in drier situations shorter and stouter, much more sparingly branched, 2–6 in. high. Leaves 1–3 in. long, filiform in floating specimens, stouter in terrestrial ones. Peduncle shorter or longer than the leaves, slender, usually 1 from each tuft of leaves, each bearing a single terminal spikelet. Spikelets variable in size, ⅛–¼ in. long, oblong or oblong-ovoid, obtuse, pale-green; bract (lowest glume) usually longer than the spikelet. Glumes ovate, acute, concave but scarcely keeled, green, sometimes stained with chestnut-brown. Hypogynous bristles wanting. Stamens 2 or 3. Style-branches 2. Nut ¾ the length of the glume, obovoid, biconvex, tipped by a minute point, slightly narrowed at the base, smooth, pale.—*Benth. Fl. Austral.* vii (1878) 326; *Cheesem. Man. N.Z. Fl.* (1906) 772. S. fluitans *var.* terrestris *Benth. l.c.* 325. S. crassiusculus *Cheesem. in Trans. N.Z. Inst.* xv (1883) 300 (*not of Hook. f.*). Isolepis lenticularis *R. Br. Prodr.* (1810) 222; *Hook. f. Fl. Tasm.* ii (1860) 86, t. 145D. Isolepis fluitans *T. Kirk in Trans. N.Z. Inst.* iii (1871) 166 (*not of R. Br.*).

North Island: Auckland—North Cape Peninsula, *T. F. C.*; Lake Tongonge, *H. Carse!* Waikato River, Lakes Whangape, Waikare, and Waihi, *T. Kirk! T. F. C.*; Lake Taupo, *T. Kirk!* swamps near the base of Ruapehu, *Berggren! Tryon! A. Hamilton! Petrie!* Sea-level to 2500 ft. December–March.

Also in eastern Australia and Tasmania, and very closely allied to the widely spread *S. fluitans* L. In all probability two species are included in the present circumscription of the species, but my specimens are not sufficiently good to enable me to separate them in a satisfactory manner.

1. crassiusculus Hk f. see Trans 69:1939:277

2. **S. basilaris** *C. B. Clarke in Cheesem. Man. N.Z. Fl.* (1906) 772, *and Ill. Cyp.* (1909) t. xlvii, f. 3, 4.—A dwarf species forming dense tufts 1–3 in. diam. Stems very short, $\frac{1}{8}$–$\frac{1}{2}$ in. long, much branched at the base, leafy. Leaves far overtopping the stems, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, sheathing at the base, semiterete above, channelled in front, convex at the back, tip obtuse. Spikelets terminal, solitary or rarely 2 together, concealed amongst the leaves and sometimes almost radical, $\frac{1}{10}$–$\frac{1}{6}$ in. long, ovoid, obtuse, pale-green; bract long, leafy. Glumes broadly ovate, obtuse, with broad white membranous margins, and a stout green midrib which is usually produced into a thick excurrent tip. Stamens 2. Style-branches 2. Nut orbicular-obovoid, not angled nor trigonous, slightly compressed, obtuse, smooth but not polished, minutely dotted, light- or dark-brown.—Isolepis basilaris *Hook. f. Handb. N.Z. Fl.* (1864) 302. I. novae-zealandiae *Col. in Trans. N.Z. Inst.* xxi (1889) 102.

North Island: Hawke's Bay — Mud-banks by the Ngaruroro River, *Colenso! T. Kirk! Petrie!* South Island: Westland—Jackson's, Teremakau River, *Petrie!* Otago—Not uncommon in the middle portion of the Clutha Valley, Roxburgh, Beaumont, Spear-grass Flat, *Petrie!* Pomahaka, *T. Kirk!* Sea-level to 2000 ft. November–March.

A curious little plant, in its usual state easily distinguished by the very short stems with the spikelets concealed by the leaves. But some forms have the stems more developed, and are then easily taken for small varieties of *S. Aucklandicus*, which, however, has a very different nut.

3. **S. Aucklandicus** *Boeck. in Linnaea*, xxxvi (1869–70) 491.—Forming compact grassy patches 2–6 in. diam. or more. Stems numerous, densely crowded, much branched at the base, stout or slender, striate, leafy at the base, 1–6 in. high. Leaves 2–6, equalling or longer than the stems, stout or slender, usually more or less coriaceous and rigid but sometimes almost flaccid, semiterete, convex on the back, grooved in front, tips obtuse. Spikelet solitary or rarely 2, small, $\frac{1}{12}$–$\frac{1}{8}$ in. long, broadly ovoid, varying in colour from dark chestnut-brown to pale whitish-green; bract very long, leafy, obtuse at the tip. Glumes few, ovate, obtuse, concave, often with a thick excurrent keel, very variable in colour. Stamens 3 or 2. Style-branches 3. Nut elliptic-ovoid, compressed, trigonous with the angles rounded, white or pale-yellow, smooth but not polished.—*Cheesem. Man. N.Z. Fl.* (1906) 773. Isolepis Aucklandica *Hook. f. Fl. Antarct.* i (1844) 88, t. 50; *Handb. N.Z. Fl.* (1864) 302. Isolepis cartilaginea *var.* rigida *Berggr. in Minnesk. Fisiog. Sallsk. Lund.* (1877) n. viii, 23. I. alpina *Hook. f. Fl. Tasm.* ii (1860) 86 (*in part*).

Var. **subcucullata** *C. B. Clarke in Cheesem. Man. N.Z. Fl.* (1906) 773.—Much more slender and diffuse. Stems weak, almost filiform; spikelet pale, solitary, 3–6-flowered. Glumes slightly hooded at the tip.—Isolepis subcucullata *Berggren, l.c.* 22, t. 5, f. 16–20.

North Island: Very plentiful around Tongariro and Ruapehu, *T. F. C.;* Rangipo Desert, *Petrie!* Ruahine Mountains, *Colenso!* ascending to 5000 ft.; Tararua Mountains, *B. C. Aston! Petrie!* South Island: Not uncommon in mountain-swamps throughout. Stewart Island, Auckland, Campbell, and Antipodes Islands: Plentiful in moist places, descending to sea-level. Macquarie Island: *H. Hamilton!*

A variable plant. The typical state can be recognized without much difficulty by the dense leafy habit, the leaves frequently overtopping the stems, by the small usually solitary spikelets, and pale elliptic-ovoid nut. But lowland states, with a more slender and less leafy habit, are difficult to separate from *S. cernuus*. Other forms approach very closely to *S. antarcticus*. According to Mr. C. B. Clarke, the species is also found in Tasmania and Amsterdam Island.

4. **S. cernuus** *Vahl. Enum.* ii (1806) 245.—Stems densely tufted, very slender, quite glabrous, 2–6 in. high, rarely more. Leaves setaceous, 1–3 near the base of the stem and shorter than it. Spikelets solitary or 2–3 together, ovoid or oblong-ovoid, $\frac{1}{10}$–$\frac{1}{5}$ in. long; bract variable in length, usually exceeding the spikelets, continuous with the stem so that the spikelets appear to be lateral. Glumes 6–15, broadly ovate, concave or obscurely keeled, obtuse or with a short point, green or chestnut-brown. Stamens 3, rarely 2 or 1. Style-branches 3, long, linear. Nut about $\frac{1}{2}$ the length of the glume, trigonous, obovoid, obtuse, minutely apiculate, not longitudinally ribbed, the surface appearing to be minutely reticulate from the numerous subquadrate cells.—*Cheesem. Man. N.Z. Fl.* (1906) 773. S. Savii *Sebast. and Mauri Prodr. Fl. Rom.* (1818) 22. S. riparius *Poir. Encycl. Suppl.* v, 103; *Benth. Fl. Austral.* vii (1878) 327. Isolepis riparia *R. Br. Prodr.* (1810) 222; *Hook. f. Fl. Tasm.* ii (1860) 89, t. 145c; *Handb. N.Z. Fl.* (1864) 302. I. setacea *Hook. f. Fl. Nov. Zel.* i (1853) 271 (*in part, not of R. Br.*). I. setosa *Raoul Choix* (1846) 40.

North and South Islands, Stewart Island, Chatham Islands, Auckland and Campbell Islands: Abundant throughout. Sea-level to 2000 ft. November–February.

Nearly cosmopolitan, being found in all temperate and tropical countries except south-eastern Asia. In New Zealand there are two principal forms: one, which is usually littoral, has the stems rather stiff, the spikelets usually solitary and often chestnut-brown, and the nut broadly obovoid; the other is more slender, the spikelets are paler, and the nut much smaller, more elliptical, and more acutely trigonous.

5. **S. antarcticus** (*Linn.*) *Mant.* ii (1771) 181.—Densely tufted, very variable in size, sometimes $\frac{1}{2}$–$1\frac{1}{2}$ in. high, stout, rigid, cartilaginous; at other times taller and more slender, 3–6 in. high or more. Leaves 1 or several at the base of the stem and shorter than it, obtuse at the tip, rigid and coriaceous in the smaller forms, softer and more grassy in the larger ones. Heads solitary, terminal, of 1–4 spikelets in the small stout forms, of 3–9 in the larger ones; bracts $\frac{1}{4}$–1 in. long, usually far exceeding the head. Spikelets rather stout, ovoid-oblong, $\frac{1}{8}$–$\frac{1}{5}$ in. long, many-flowered. Glumes broadly ovate, boat-shaped with a prominent keel, obtuse or the keel produced into a short point, often rigid and coriaceous, pale whitish-yellow with a conspicuous dark chestnut-brown spot; sides broad, marked with prominent curved lines; back often curved. Hypogynous scales wanting. Stamens 3 or 2, rarely 1. Style-branches 3. Nut rather more than $\frac{1}{2}$ as long as the glume, elliptic-ovoid, trigonous, acute, minutely punctate, white to yellow, sometimes ultimately almost black.—*C. B. Clarke in Fl. Cap.* vii (1898) 223; *Cheesem. Man. N.Z. Fl.* (1906) 774. S. cartilagineus *Poir. Encycl. Suppl.* v (1811) 103; *Benth. Fl. Austral.* vii (1878) 328. S. ebenocarpus *T. Kirk in Trans. N.Z. Inst.* xvii (1885) 224. Isolepis cartilaginea *R. Br. Prodr.* (1810) 222; *Hook. f. Fl. Nov. Zel.* i (1853) 271; *Fl. Tasm.* ii (1860) 88, t. 145; *Handb. N.Z. Fl.* (1864) 302.

North Island: Hawke's Bay—*Colenso! A. Hamilton!* Wellington—Karioi, Kaiwarawara, *T. Kirk!* South Island: Nelson—Cape Farewell, *T. Kirk!* Canterbury—Banks Peninsula, *A. Wall;* Burnham, *T. Kirk!* Springfield, *T. F. C.* Otago—Catlin's River, *Petrie!* Lake Wakatipu, *T. Kirk!* Bluff Hill, *T. Kirk!* Stewart Island: Port Pegasus, *Petrie! T. Krik!* Sea-level to 2000 ft. November–March.

Also in extratropical Australia, South Africa, and St. Helena.

6. **S. inundatus** *Poir. Encycl. Suppl.* v (1811) 103.—Very variable in size and habit of growth. Stems 2–12 in. high, often small, slender and filiform, at other times stouter and taller, and resembling small states of

S. sulcatus and *S. prolifer*. Leaves 1 or rarely 2 at the base of the stem, or reduced to a short and broad sheath. Heads solitary, terminal, of 2–15 crowded spikelets, often proliferous and putting out 1 or several short or long branches ending in a smaller head of spikelets; bract very variable in length. Spikelets $\frac{1}{10}$–$\frac{1}{4}$ in. long, ovate or ovate-oblong, subacute, pale or dark chestnut-brown, many-flowered. Glumes broadly ovate, concave or keeled at the back, obtuse or subacute, the sides usually more or less stained or striate with dark red-brown, the keel usually pale. Stamen 1. Style-branches 3, long, linear. Nut about $\frac{1}{2}$ the length of the glume, oblong-obovoid, equally and conspicuously trigonous, with a small conical point, not longitudinally ribbed, white, smooth but not polished.—*Benth. Fl. Austral.* vii (1878) 329. S. reticularis *Col. in Trans. N.Z. Inst.* xviii (1886) 277; *Cheesem. Man. N.Z. Fl.* (1906) 775. Isolepis inundata *R. Br. Prodr.* (1810) 222. I. prolifer *Hook. f. Handb. N.Z. Fl.* (1864) 301; *Fl. Tasm.* ii (1860) 87, t. 144 (*not of R. Br.*). I. setacea *Hook. f. Fl. Nov. Zel.* i (1853) 271 (*in part, not of R. Br.*).

Var. **major**.—Stems tall and stout, 5–12 in. high, usually leafless. Spikelets more numerous, 6–15, densely compacted. Glumes obtuse. Approaches small forms of *S. sulcatus*, but is at once distinguished by the smaller acutely trigonous nut.

Var. **gracillima**.—Stems slender, often filiform, 2–6 in. long. Spikelets 2–6,

223.

Scirpus platycarpus S. T. Blake in Proceed. R.S.Q. LI (2) 1940, p.180.

tufted, 8–16 in. high, stout, grooved when dry, leafless except a large purple or purplish-black sheath at the base. Heads solitary, terminal, of 6–20 densely packed spikelets, often proliferous and emitting 1 or several branches ending in a smaller head of spikelets; bract variable in length. Spikelets rather short, $\frac{1}{8}$–$\frac{1}{4}$ in. long, oblong, obtuse, many-flowered. Glumes broadly ovate, obtuse, concave, dark chestnut-brown with a green keel and pale margins. Hypogynous bristles wanting. Stamens usually 1. Style-branches 2, rarely 3, long, linear. Nut about $\frac{1}{2}$ the length of the glume, obovoid, plano-convex, the convex side not keeled, smooth and polished, shining, white or pale yellowish-white.—Isolepis prolifer *Hook. f. Fl. Nov. Zel.* i (1853) 271 (*for the most part, but not of R. Br., nor of Hook. f.*); *Handb. N.Z. Fl.* (1864) 301.

North and South Islands: Apparently common: Auckland—Hokianga, *Berggren;* Whangarei, *H. Carse!* vicinity of Auckland, *Petrie! T. F. C.;* Rotorua, *Cartwright, Petrie! T. F. C.;* Taupo, *T. Kirk!* Hawke's Bay—Norsewood, *Colenso!* Wellington—Murimotu, *Petrie!* Canterbury—Styx River, *Petrie!* Banks Peninsula, *R. M. Laing!* near Ashburton, *H. H. Allan.* Sea-level to 2000 ft. November–March.

For the identification of this plant with the Tristan d'Acunha *S. sulcatus* I am indebted to Mr. C. B. Clarke, who, however, maintains it as a distinct variety, characterized by the usually 2-fid style and plano-convex nut not keeled on the convex face. Large stout forms of *S. inundatus* approach it very closely, but in fruit are easily distinguished by the 3-fid style and acutely trigonous nut. *S. prolifer*, which has precisely the same habit of growth, can always be separated by the long linear spikelets, 3 stamens, and small acutely trigonous nut.

S. nervosus T. Kirk 1885 17: 224.

1. cernua (Vahl) Roem. et Schult. 1817

4. **S. cernuus** *Vahl. Enum.* ii (1806) 245.—Stems densely tufted, very slender, quite glabrous, 2–6 in. high, rarely more. Leaves setaceous, 1–3 near the base of the stem and shorter than it. Spikelets solitary or 2–3 together, ovoid or oblong-ovoid, $\frac{1}{10}$–$\frac{1}{5}$ in. long; bract variable in length, usually exceeding the spikelets, continuous with the stem so that the spikelets appear to be lateral. Glumes 6–15, broadly ovate, concave or obscurely keeled, obtuse or with a short point, green or chestnut-brown. Stamens 3, rarely 2 or 1. Style-branches 3, long, linear. Nut about $\frac{1}{2}$ the length of the glume, trigonous, obovoid, obtuse, minutely apiculate, not longitudinally ribbed, the surface appearing to be minutely reticulate from the numerous subquadrate cells.—*Cheesem. Man. N.Z. Fl.* (1906) 773. S. Savii *Sebast. and Mauri Prodr. Fl. Rom.* (1818) 22. S. riparius *Poir. Encycl. Suppl.* v, 103; *Benth. Fl. Austral.* vii (1878) 327. Isolepis riparia *R. Br. Prodr.* (1810) 222; *Hook. f. Fl. Tasm.* ii (1860) 89, t. 145c; *Handb. N.Z. Fl.* (1864) 302. I. setacea *Hook. f. Fl. Nov. Zel.* i (1853) 271 (*in part, not of R. Br.*). I. setosa *Raoul Choix* (1846) 40.

3.

North and South Islands, Stewart Island, Chatham Islands, Auckland and Campbell Islands: Abundant throughout. Sea-level to 2000 ft. November–February. Cheesem. Rep. Bot. Stew. Id. 50.

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ones. Heads solitary, terminal, of 1–4 spikelets in the small stout form, of 3–9 in the larger ones; bracts $\frac{1}{4}$–1 in. long, usually far exceeding the head. Spikelets rather stout, ovoid-oblong, $\frac{1}{8}$–$\frac{1}{5}$ in. long, many-flowered. Glumes broadly ovate, boat-shaped with a prominent keel, obtuse or the keel produced into a short point, often rigid and coriaceous, pale whitish-yellow with a conspicuous dark chestnut-brown spot; sides broad, marked with prominent curved lines; back often curved. Hypogynous scales wanting. Stamens 3 or 2, rarely 1. Style-branches 3. Nut rather more than $\frac{1}{2}$ as long as the glume, elliptic-ovoid, trigonous, acute, minutely punctate, white to yellow, sometimes ultimately almost black.—*C. B. Clarke in Fl. Cap.* vii (1898) 223; *Cheesem. Man. N.Z. Fl.* (1906) 774. S. cartilagineus *Poir. Encycl. Suppl.* v (1811) 103; *Benth. Fl. Austral.* vii (1878) 328. S. ebenocarpus *T. Kirk in Trans. N.Z. Inst.* xvii (1885) 224. Isolepis cartilaginea *R. Br. Prodr.* (1810) 222; *Hook. f. Fl. Nov. Zel.* i (1853) 271; *Fl. Tasm.* ii (1860) 88, t. 145; *Handb. N.Z. Fl.* (1864) 302.

North Island: Hawke's Bay — *Colenso! A. Hamilton!* Wellington — Karioi, Kaiwarawara, *T. Kirk!* South Island: Nelson—Cape Farewell, *T. Kirk!* Canterbury—Banks Peninsula, *A. Wall;* Burnham, *T. Kirk!* Springfield, *T. F. C.* Otago—Catlin's River, *Petrie!* Lake Wakatipu, *T. Kirk!* Bluff Hill, *T. Kirk!* Stewart Island: Port Pegasus, *Petrie! T. Krik!* Sea-level to 2000 ft. November–March.

Also in extratropical Australia, South Africa, and St. Helena.

(R.Br.)

6. **S. inundatus** *Poir. Encycl. Suppl.* v (1811) 103.—Very variable in size and habit of growth. Stems 2–12 in. high, often small, slender and filiform, at other times stouter and taller, and resembling small states of

S. sulcatus and *S. prolifer*. Leaves 1 or rarely 2 at the base of the stem, or reduced to a short and broad sheath. Heads solitary, terminal, of 2–15 crowded spikelets, often proliferous and putting out 1 or several short or long branches ending in a smaller head of spikelets; bract very variable in length. Spikelets $\frac{1}{10}$–$\frac{1}{4}$ in. long, ovate or ovate-oblong, subacute, pale or dark chestnut-brown, many-flowered. Glumes broadly ovate, concave or keeled at the back, obtuse or subacute, the sides usually more or less stained or striate with dark red-brown, the keel usually pale. Stamen 1. Style-branches 3, long, linear. Nut about $\frac{1}{2}$ the length of the glume, oblong-obovoid, equally and conspicuously trigonous, with a small conical point, not longitudinally ribbed, white, smooth but not polished.—*Benth. Fl. Austral.* vii (1878) 329. S. reticularis *Col. in Trans. N.Z. Inst.* xviii (1886) 277; *Cheesem. Man. N.Z. Fl.* (1906) 775. Isolepis inundata *R. Br. Prodr.* (1810) 222. I. prolifer *Hook. f. Handb. N.Z. Fl.* (1864) 301; *Fl. Tasm.* ii (1860) 87, t. 144 (*not of R. Br.*). I. setacea *Hook. f. Fl. Nov. Zel.* i (1853) 271 (*in part, not of R. Br.*).

Var. **major**.—Stems tall and stout, 5–12 in. high, usually leafless. Spikelets more numerous, 6–15, densely compacted. Glumes obtuse. Approaches small forms of *S. sulcatus*, but is at once distinguished by the smaller acutely trigonous nut.

Var. **gracillima**.—Stems slender, often filiform, 2–6 in. long. Spikelets 2–6, attened. Glums often subacute.

North and South Islands, Stewart Island, Chatham Islands: Abundant hroughout. Sea-level to 3000 ft. November–March.

As defined above, this varies so much in habit and other respects as to give rise o the suspicion that more species than one are included in it; but I have failed to d valid distinguishing characters. It extends through Australia to the Malay Archielago, and is also abundant in temperate South America.

7. **S. sulcatus** *Thouars Esquisse Fl. Trist.* 36, t. 7; var. **distigmatosa** . *B. Clarke in Cheesem. Man. N.Z. Fl.* (1906) 775.—Stems numerous, tufted, 8–16 in. high, stout, grooved when dry, leafless except a large purple or purplish-black sheath at the base. Heads solitary, terminal, of 6–20 densely packed spikelets, often proliferous and emitting 1 or several branches ending in a smaller head of spikelets; bract variable in length. Spikelets rather short, $\frac{1}{8}$–$\frac{1}{4}$ in. long, oblong, obtuse, many-flowered. Glumes broadly ovate, obtuse, concave, dark chestnut-brown with a green keel and pale margins. Hypogynous bristles wanting. Stamens usually 1. Style-branches 2, rarely 3, long, linear. Nut about $\frac{1}{2}$ the length of the glume, obovoid, plano-convex, the convex side not keeled, smooth and polished, shining, white or pale yellowish-white.—Isolepis prolifer *Hook. f. Fl. Nov. Zel.* i (1853) 271 (*for the most part, but not of R. Br., nor of Hook. f.*); *Handb. N.Z. Fl.* (1864) 301.

North and South Islands: Apparently common: Auckland—Hokianga, *Berggren;* Whangarei, *H. Carse!* vicinity of Auckland, *Petrie! T. F. C.;* Rotorua, *Cartwright, Petrie! T. F. C.;* Taupo, *T. Kirk!* Hawke's Bay—Norsewood, *Colenso!* Wellington—Murimotu, *Petrie!* Canterbury—Styx River, *Petrie!* Banks Peninsula, *R. M. Laing!* near Ashburton, *H. H. Allan.* Sea-level to 2000 ft. November–March.

For the identification of this plant with the Tristan d'Acunha *S. sulcatus* I am indebted to Mr. C. B. Clarke, who, however, maintains it as a distinct variety, characterized by the usually 2-fid style and plano-convex nut not keeled on the convex face. Large stout forms of *S. inundatus* approach it very closely, but in fruit are easily distinguished by the 3-fid style and acutely trigonous nut. *S. prolifer*, which has precisely the same habit of growth, can always be separated by the long linear spikelets, 3 stamens, and small acutely trigonous nut.

8. **S. prolifer** *Rottb. Descr. et Ic.* (1773) 55, t. 17, f. 2.—Stems numerous, tufted, 1–2 ft. high or more, rather stout, striate when dry, leafless except a large purplish or purplish-black sheath at the base. Heads large, ½–1 in. diam., terminal, solitary, of very many (10–30) densely crowded spikelets, often proliferous and putting out 1 or several usually long branches terminating in a much smaller head of spikelets; bract shorter than the head, obtuse. Spikelets long and narrow, ⅕–½ in. long, linear or linear-oblong, cylindrical, obtuse, many-flowered. Glumes ovate, obtuse, concave, chestnut-brown with a paler keel and margins. Hypogynous bristles wanting. Stamens 3. Style-branches 3, long, linear. Nut rather small, less than ½ the length of the glume, elliptic-ovoid, acute, acutely trigonous, smooth, pale yellowish-brown or almost white.—*Benth. Fl. Austral.* vii (1878) 330; *Cheesem. Man. N.Z. Fl.* (1906) 776. Isolepis prolifera *R. Br. Prodr.* (1810) 223. I. globosa *Buch. in Trans. N.Z. Inst.* iii (1871) 211.

North Island: Auckland—Bay of Islands, *T. Kirk!* Wellington—Karori, Evans Bay, and other localities in the vicinity of the City of Wellington, *Buchanan! T. Kirk! Petrie! B. C. Aston!* Wairarapa, *T. Kirk!* November–March.

Also in New South Wales, and abundant in South Africa. Easily separated from *S. sulcatus* and large states of *S. inundatus* by the very numerous long and narrow spikelets, and flowers with 3 stamens.

9. **S. nodosus** *Rottb. Descr. et Ic.* (1773) 52, t. 8, f. 3.—Rhizome short, stout, woody, creeping, ¼ in. diam. or more. Stems very numerous, closely packed, 1–3 ft. high, erect, rigid, terete or slightly compressed. Leaves wanting except 2 or 3 sheathing scales at the base of the stems. Head solitary, globose, brown, ⅓–⅔ in. diam., of very numerous densely crowded spikelets; bract ½–1½ in. long, rigid, erect, continuous with the stem, so that the head appears lateral. Spikelets ovoid, ⅙–⅕ in. long, many-flowered. Glumes broadly ovate, obtuse or obscurely mucronate, concave. Hypogynous bristles wanting. Stamens 3. Style-branches 3, linear. Nut less than ½ the length of the glume, obovoid, obtusely trigonous, the flat face next the glume, pale-brown, smooth and polished.—*Benth. Fl. Austral* vii (1878) 331; *Cheesem. Man N.Z. Fl.* (1906) 776. Isolepis nodosa *R. Br. Prodr.* (1810) 221; *A. Rich. Fl. Nouv. Zel.* (1832) 104; *A. Cunn. Precur.* (1836) n. 272; *Raoul Choix* (1846) 40; *Hook f. Fl. Nov. Zel.* i (1853) 270; *Handb. N.Z. Fl.* (1864) 301.

Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Abundant throughout. Sea-level to 2000 ft. November–February.

Also found in Norfolk Island and Lord Howe Island, temperate Australia, extra-tropical South Africa, St. Helena and Amsterdam Islands, and temperate South America.

10. **S. frondosus** *Banks and Sol. ex Boeck. in Flora*, lxi (1878) 141.—Stout, rigid, harsh, yellow-green, 2–3 ft. high. Rhizome thick, woody, creeping, often many feet in length. Stems many along the rhizome, stout, erect, obtusely trigonous, leafy at the base. Leaves very numerous, spreading, often curved, rigidly coriaceous, channelled above, keeled beneath, gradually narrowed into long trigonous points, at the base expanded into broad membranous sheaths; margins and keel sharply denticulate. Inflorescence 3–9 in. long or more, of linear clusters of densely crowded sessile spikelets arranged in a spiral manner around the upper part of the stem, each cluster subtended by a rigid linear bract similar to the leaves. Spikelets red-brown, almost globose, about ⅛ in. long, many-flowered.

Glumes broadly ovate, obtuse, concave, shining, striate. Hypogynous bristles wanting. Stamens 3; anthers with a long awn. Style-branches 3. Nut broadly obovoid, compressed, quite smooth.—*Cheesem. Man. N.Z. Fl.* (1906) 777; *C. B. Clarke Ill. Cyp.* (1909) t. liii, f. 1–3. Isolepis spiralis *A. Rich. Fl. Nouv. Zel.* (1832) 105, t. 19; *A. Cunn. Precur.* (1836) n. 274; *Raoul Choix* (1846) 40. Desmoschoenus spiralis *Hook. f. Fl. Nov. Zel.* i (1853) 272; *Handb. N.Z. Fl.* (1864) 303. Anthophyllum Urvillei *Steud. Syn. Pl. Cyp.* (1855) 160.

North and South Islands, Chatham Islands: Abundant on sand-dunes from the North Cape to Otago. Stewart Island: Abundant, *Cockayne. Pingao.* November-February.

The leaves were formerly used by the Maoris for making kits, and occasionally for cloaks, which were said to be very durable.

11. **S. americanus** *Pers. Syn.* i (1805) 68.—Rhizome creeping. Stems rather slender, 1–2 ft. high, acutely trigonous. Leaves 1–4, always shorter than the stem; sheaths long. Head small, of 1–4 closely compacted sessile spikelets; bract 1–2 in. long, erect, angular, continuous with the stem so that the head appears lateral. Spikelets broadly ovoid, $\frac{1}{4}$–$\frac{1}{3}$ in. long, dark-brown, many-flowered. Glumes broadly ovate, membranous, concave, tip emarginate with usually a short awn in the notch, margins scarious above. Hypogynous bristles 4–6, shorter than the nut. Stamens 3. Style-branches 2–3. Nut rather large, $\frac{2}{3}$ the length of the glume, obovoid, plano-convex, pale-brown, smooth.—*Cheesem. Man. N.Z. Fl.* (1906) 777. S. pungens *Vahl. Enum.* ii (1806) 255; *Benth. Fl. Austral.* vii (1878) 333. S. triqueter *R. Br. Prodr.* (1810) 223; *Hook. f. Fl. Nov. Zel.* i (1853) 269; *Handb. N.Z. Fl.* (1864) 300 (*not of Linn.*). S. novae-zealandiae *Col. in Trans. N.Z. Inst.* xviii (1886) 277.

North and South Islands, Chatham Islands: Brackish-water swamps from Hokianga to Foveaux Strait, but often local. Inland at Roxburgh, Otago, *Petrie!* November–February.

Not uncommon in temperate Australia and Tasmania, North and South America, and southern Europe.

12. **S. lacustris** *Linn. Sp. Plant.* (1753) 48.—Rhizome stout, creeping, with numerous perpendicular rootlets. Stems 2–6 ft. high, sometimes almost as thick as the finger, terete, spongy, glaucous. Leaves wanting, or the uppermost sheath with a very short flat lamina. Inflorescence a terminal simple or compound cymose umbel 2–4 in. across; rays few, stout, irregular; bract shorter than the umbel, continuous with the stem. Spikelets numerous, ovoid or oblong, $\frac{1}{3}$ in. long, brownish, many-flowered. Glumes broadly ovate, membranous, concave, notched at the tip with a small point in the notch, margins fringed. Hypogynous bristles 5–6, linear, retrorsely scabrid, usually equalling the nut. Stamens 3. Style-branches 3 or 2. Nut more than $\frac{1}{2}$ as long as the glume, obovoid, compressed, plano-convex, pale-brown, smooth.—*A. Rich. Fl. Nouv. Zel.* (1832) 103; *A. Cunn. Precur.* (1836) n. 275; *Raoul Choix* (1846) 40; *Hook. f. Fl. Nov. Zel.* i (1853) 269; *Handb. N.Z. Fl.* (1864) 300; *Benth. Fl. Austral.* vii (1878) 333; *Cheesem. Man. N.Z. Fl.* (1906) 778.

North and South Islands: Margins of lakes and ponds from the North Cape southwards to the north of Otago and Okarito, common. Sea-level to 1500 ft. November–February.

Generally distributed in all temperate and warm countries, except South America.

13. **S. maritimus** *Linn. Sp. Plant.* (1753) 74.—Rhizome woody, creeping, the nodes often dilated into hard tubers. Stems stout, sharply triangular, 1–3 ft. high or more. Leaves from near the base of the stem and often exceeding it, broad, flat, grassy. Inflorescence an irregular terminal umbel of few unequal rays, often contracted into a compact cluster; bracts 3–4, 3–9 in. long, similar to the leaves. Spikelets $\frac{1}{2}$–$\frac{3}{4}$ in. long, sessile or peduncled, ovoid or cylindric, brown, many-flowered. Glumes ovate, membranous, 2-lobed at the tip with a short intermediate awn, usually pubescent towards the tip. Hypogynous bristles 3–6, shorter than the nut, retrorsely scabrid. Stamens 3. Style-branches 3 or 2, long, linear. Nut less than $\frac{1}{2}$ the length of the glume, broadly obovoid, compressed, flat on one side, convex or obtusely angled on the other, smooth and polished, brown when fully ripe.—*Raoul Choix* (1846) 40; *Hook. f. Fl. Nov. Zel.* i (1853) 269; *Handb. N.Z. Fl.* (1864) 300; *Cheesem. Man. N.Z. Fl.* (1906) 778. See Britton & Brown I. 326.

Var. **fluviatilis** *Torr. in Ann. Lyceum New York*, iii (1836) 324.—Taller and stouter, 3–6 ft. high. Leaves broader, $\frac{1}{2}$ in. diam. or more; bracts longer. Umbel larger, more often compound; rays 3–9. Spikelets large, pale-brown. Style-branches 3. Nut narrower, oblong-obovoid, trigonous, conspicuously beaked, white or pale-brown, opaque, polished.—*Benth. Fl. Austral.* vii (1878) 335. S. fluviatilis *Asa Gray Man. Bot. U.S.* (1856) 500. (Tau)

Var. **macrostachya** *Michx. Fl. Bor. Amer.* v (1803) 32.—Umbels simple or compound. Spikelets large, sometimes over 1 in. long. Style-branches almost always 2. Nut large, broadly obovoid, flat on one side and obscurely angled on the other, white or pale-brown, opaque, not polished.—*Asa Gray Man. Bot. U.S.* (1856) 500. S. robustus Pursh.

North and South Islands: The two varieties not uncommon in brackish-water swamps and on the banks of lakes and streams from the North Cape to Otago Harbour. November–February.

In the North Island var. *fluviatilis* extends inland along most of the larger rivers, ascending the Waikato as far as Lake Taupo. Var. *macrostachya* seems to be chiefly found in brackish-water swamps. Both varieties are abundant in North America, and also in Australia and Tasmania. According to Mr. C. B. Clarke, the typical form of the species has not yet been observed in either Australia or New Zealand.

7. CARPHA R. Br. 1810

Perennial herbs. Leaves crowded at the base of the stem, usually shorter than it. Spikelets numerous, narrow, 1-flowered, arranged in a terminal corymb or panicle, sometimes contracted into a more or less dense head. Glumes usually 4, distichous; the 2 lowest small, empty; the third large, also empty; the uppermost about the same size, with a single hermaphrodite flower in its axil. Hypogynous bristles 6, plumose, much enlarged in fruit and exceeding the glumes. Stamens 3. Style-branches 3. Nut oblong, 3-angled, narrowed above into the persistent and hardened base of the style.

In addition to the New Zealand species, which is also found in Tasmania, Victoria, and on the mountains of New Guinea, there are 2 or 3 closely allied species in Chile and Fuegia.

1. **C. alpina** *R. Br. Prodr.* (1810) 230.—A tufted grass-like herb 3–12 in. high. Leaves usually shorter than the stems, numerous, narrow-linear, rigid, obtuse at the tip, flat or concave, grooved, dilated at the base into broad membranous sheaths. Spikelets $\frac{1}{3}$–$\frac{1}{2}$ in. long, lanceolate, compressed, arranged in a corymbose manner at the top of the stem, in small specimens

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...warding. Nut oblong, obtuse, not trigonous, white .. 3. *S. Carsei.*
Stems 1–3 ft., slender. Spikelets few (2–8), ¼ in. Hypogynous bristles present, very long. Nut elliptic, trigonous, pale-brown .. 4. *S. pauciflorus.*

** Stems shorter, not so rigid, often diffuse. Leaves well developed. Spikelets fascicled or umbelled, sometimes solitary.

Stems 2–6 in., creeping or diffuse. Leaves alternate, spreading. Spikelets 1–3 in the axils of the leaves .. .. .. 5. *S. axillaris.*
Stems 6–14 in., slender, diffuse. Leaves mostly at the base of the stems, linear. Spikelets in irregular umbels or fascicles .. 6. *S. apogon.*
Stems 1–12 in., slender, wiry, rigid. Leaves few at the base of the stems. Spikelets sessile in a dense head, sometimes few or solitary 7. *S. nitens.*

1. **S. brevifolius** *R. Br. Prodr.* (1810) 231.—Rhizome short, stout, creeping. Stems rush-like, densely tufted, rigid, erect, terete, smooth and polished, 1–2 ft. high. Leaves reduced to 3 or 4 dark red-brown appressed sheaths at the base of the stem, the uppermost of which has a short rigid erect subulate lamina ½–1 in. long. Panicle narrow, 3–8 in. long; branches slender, erect; bracts at the base with appressed sheaths

TN.Z.T.56:9.
1929

SCHOENUS CAESPITANS Petrie. Species dense caespitans depressa c. 4 cm. (1-1½ in. alta. Folia a bas erecta, filiformia, culmos aequantia vel excedentia, basi = expansa ac vaginantia; culmi folius crassiores virides erecti; inflorescentia brevis capituliformis; capitulum parvum sublonge bracheatum, e fasciculis tribus 8-10 florigeris arcte aggregatis compositum; glumae distichae 3 inferiores vacuae, quarta florem hermaphrodit gerens, summa vacuo raro staminifera; setae plerumque 3; stylus erectus supra in ramos 3 divaricantes divisus; spiculae culmique maturi haud visi. Ure Valley, A. Wall.

TN.T.I. 56.50 1926.

"Schoenus fluitans Hook. A slender, spreading much-branched water or mud plant; branches slender. Leaves slender, filiform, mostly 2 or 3 inches long, solitary at intervals or tufted at nodes. Spikelets usually solitary, at the ends of the branches, linear, 4 or 5 lines long contained in 2 more or less glume-like bracts, 2-4 flowers, with only one or no empty glumes. Hypogynous bristles none. Stamens 3. Nut ovoid, prominently 3-ribbed." (Rodway).

shorter than it. Spikelets numerous, narrow, 1-flowered, arranged in a terminal corymb or panicle, sometimes contracted into a more or less dense head. Glumes usually 4, distichous; the 2 lowest small, empty; the third large, also empty; the uppermost about the same size, with a single hermaphrodite flower in its axil. Hypogynous bristles 6, plumose, much enlarged in fruit and exceeding the glumes. Stamens 3. Style-branches 3. Nut oblong, 3-angled, narrowed above into the persistent and hardened base of the style.

In addition to the New Zealand species, which is also found in Tasmania, Victoria, and on the mountains of New Guinea, there are 2 or 3 closely allied species in Chile and Fuegia.

1. **C. alpina** *R. Br. Prodr.* (1810) 230.—A tufted grass-like herb 3–12 in. high. Leaves usually shorter than the stems, numerous, narrow-linear, rigid, obtuse at the tip, flat or concave, grooved, dilated at the base into broad membranous sheaths. Spikelets ⅓–½ in. long, lanceolate, compressed, arranged in a corymbose manner at the top of the stem, in small specimens

crowded into a head. Bracts leafy, usually exceeding the inflorescence. Glumes rigidly membranous, linear-oblong, pale, shining, concave. Hypogynous bristles very large, in the fruiting stage exceeding the glumes, conspicuously plumose for their whole length. Nut narrow-oblong, prismatic, tipped by the long hardened base of the style.—*Hook. f. Fl. Nov. Zel.* i (1853) 273; *Fl. Tasm.* ii (1860) 84; *Handb. N.Z. Fl.* (1864) 299; *Benth. Fl. Austral.* vii (1878) 381, *and in Hook. Ic. Plant.* t. 1216.

North Island: Mountain districts from Moehau (Cape Colville) and the East Cape southwards. South Island, Stewart Island: Abundant in hilly and mountain districts throughout. Auckland Islands: Carnley Harbour, *T. Kirk!* Usually from 2500 to 5000 ft., but descends to sea-level in Stewart Island. December–February.

8. **SCHOENUS** Linn.

Usually perennial herbs, of very various habit, stout, erect and rush-like, or slender and diffuse, rarely creeping. Leaves near the base of the stem or cauline, sometimes reduced to sheathing scales. Spikelets compressed, few-flowered, panicled or capitate or fascicled. Glumes more or less distichous, 3 or more outer ones empty, 1–4 succeeding ones hermaphrodite and fruit-bearing, uppermost male or empty; rhachilla elongated and flexuose between the flowering glumes, with the flowers seated in the alternate notches. Hypogynous bristles present or wanting. Stamens usually 3, rarely fewer or 4–6. Style slender, sometimes slightly thickened near the base; style-branches 3. Nut obovoid, ovoid, or oblong, trigonous.

A large genus of about 70 species, mainly from Australia and New Zealand, but a few are widely distributed in the temperate regions of the Northern Hemisphere, and 2–3 are Malayan. Of the 7 species found in New Zealand, 3 are endemic, the remaining 4 extend to Australia and Tasmania.

* Stems densely tufted, erect, terete, rush-like. Leaves either reduced to appressed sheaths or a short erect lamina alone present. Spikelets in a narrow terminal panicle.

Stems 1–2 ft., rather stout. Spikelets many, $\frac{1}{3}$–$\frac{1}{2}$ in. long. Hypogynous bristles wanting. Nut trigonous, faces transversely rugose — 1. *S. brevifolius.*
Stems 1–3 ft., slender. Spikelets few or many, $\frac{1}{4}$ in. long. Hypogynous bristles present, equalling the nut or shorter than it. Nut obovoid, smooth .. .. — 2. *S. Tendo.*
Stems 1–2$\frac{1}{2}$ ft., very slender. Spikelets many, $\frac{1}{4}$–$\frac{1}{3}$ in. Hypogynous bristles wanting. Nut oblong, obtuse, not trigonous, white .. — 3. *S. Carsei.*
Stems 1–3 ft., slender. Spikelets few (2–8), $\frac{1}{4}$ in. Hypogynous bristles present, very long. Nut elliptic, trigonous, pale-brown .. — 4. *S. pauciflorus.*

** Stems shorter, not so rigid, often diffuse. Leaves well developed. Spikelets fascicled or umbelled, sometimes solitary.

Stems 2–6 in., creeping or diffuse. Leaves alternate, spreading. Spikelets 1–3 in the axils of the leaves .. .. .. — 5. *S. axillaris.*
Stems 6–14 in., slender, diffuse. Leaves mostly at the base of the stems, linear. Spikelets in irregular umbels or fascicles .. — 6. *S. apogon.*
Stems 1–12 in., slender, wiry, rigid. Leaves few at the base of the stems. Spikelets sessile in a dense head, sometimes few or solitary — 7. *S. nitens.*

1. **S. brevifolius** *R. Br. Prodr.* (1810) 231.—Rhizome short, stout, creeping. Stems rush-like, densely tufted, rigid, erect, terete, smooth and polished, 1–2 ft. high. Leaves reduced to 3 or 4 dark red-brown appressed sheaths at the base of the stem, the uppermost of which has a short rigid erect subulate lamina $\frac{1}{2}$–1 in. long. Panicle narrow, 3–8 in. long; branches slender, erect; bracts at the base with appressed sheaths

and a short erect lamina. Spikelets lanceolate, compressed, $\frac{1}{3}$–$\frac{1}{2}$ in. long, 2–3-flowered, red-brown. Glumes 6–9, distichous, ovate-lanceolate, acute, concave, nerveless; margins ciliate; the 4–6 outer smaller and empty. Hypogynous bristles wanting. Stamens usually 2. Style-branches 3. Nut small, turgid, obovoid, trigonous with the angles thickened, faces transversely rugose.—*Benth. Fl. Austral.* vii (1878) 170; *Cheesem. Man. N.Z. Fl.* (1906) 780. S. tenax *Hook. f. Handb. N.Z. Fl.* (1864) 298. Chaetospora tenax *Hook. f. Fl. Nov. Zel.* i (1853) 273.

North Island: From the North Cape to Cook Strait, but rare and local to the south of Rotorua. South Island: Nelson—Aorere Valley, *T. Kirk!* Sea-level to 1500 ft. December–January.

Also in extratropical Australia.

2. **S. Tendo** *Banks and Sol. ex Hook. f. Handb. N.Z. Fl.* (1864) 298.—Rhizome stout, creeping. Stems much more slender than in *S. brevifolius*, 1–3 ft. high, rigid, deeply grooved throughout their length. Leaves reduced to 2–3 dark chestnut-brown or almost black sheaths at the base of the stem, the uppermost produced into a subulate lamina $\frac{1}{4}$–$\frac{1}{2}$ in. long; the mouths of the sheaths fringed with cobwebby hairs. Panicle slender, narrow, 2–8 in. long; branches short, slender, erect. Spikelets linear-lanceolate, compressed, 2–4-flowered, $\frac{1}{4}$–$\frac{1}{3}$ in. long, dark-brown or almost black. Glumes 8–10, distichous, ovate-lanceolate, acute, concave, keeled, nerveless except the midrib; margins ciliate; the 5–6 outer smaller and empty. Hypogynous bristles 3–6, short, slender, sometimes not equalling the nut. Stamens 2. Style-branches usually 2. Nut obovoid, unequally and obliquely biconvex, quite smooth, white.—*Cheesem. Man. N.Z. Fl.* (1906) 781. Chaetospora Tendo *Hook. f. Fl. Nov. Zel.* i (1853) 273.

North Island: Abundant on clay hills from the North Cape to Hawke's Bay and Taranaki. South Island: Nelson—Aorere Valley, *T. Kirk.* Sea-level to 2000 ft. October–January.

Easily distinguished from the preceding species by the more slender grooved stems, smaller darker spikelets, the presence of bristles, and by the smooth biconvex nut.

3. **S. Carsei** *Cheesem. Man. N.Z. Fl.* (1906) 781.—Rhizome short, stout, creeping, clothed with chestnut-brown scales. Stems densely tufted, very slender, 1–2½ ft. high, terete, grooved. Leaves reduced to 2–3 chestnut-brown sheaths at the base of the stem, produced at the tip into an erect subulate lamina $\frac{1}{2}$–2 in. long; the mouths of the sheaths oblique, glabrous. Panicle slender, narrow, 2–6 in. long; branches filiform, erect; bracts at the base with appressed sheaths, and a short erect lamina. Spikelets numerous, compressed, very narrow, $\frac{1}{4}$–$\frac{1}{3}$ in. long, linear-lanceolate, acute, brownish. Glumes 5–7, distichous, closely imbricate, ovate-lanceolate, acuminate, concave, keeled, thin and membranous, nerveless; the 3–4 outer empty. Hypogynous bristles wanting. Stamens 3. Style-branches 3. Nut oblong, obtuse at both ends, not trigonous, smooth, white.—*Cheesem. Ill. N.Z. Fl.* ii (1914) t. 209.

North Island: Auckland—Rangaunu Harbour, *H. Carse!* swamps at Whangarei and between the Manukau Harbour and the Waikato River, *H. Carse!* Papatoetoe, *T. Kirk!* swamps by the Waitoa River, *P. H. Allen!* Taranaki—Ngaire Swamp, *T. F. C.* January–March.

This seems to have been confounded with *S. pauciflorus*, but differs from that species in the shorter leaves, longer panicle with numerous spikelets, in the absence of bristles, and in the nut. It is probably common in lowland swamps.

Schoenus fluitans Hk.f. see Cockayne Trans. 57: 1926: Wilmanina Pl. 90.

4. **S. pauciflorus** *Hook. f. Handb. N.Z. Fl.* (1864) 298.—Rhizome short, stout, branched at the tip. Stems densely tufted, very slender, deeply grooved, 1–3 ft. high, green or purplish-red. Leaves reduced to 2–4 dark chestnut-brown or almost black sheaths at the base of the stem, the uppermost of which is produced into an erect almost filiform lamina 1–3 in. long; the mouths of the sheaths oblique, glabrous. Panicle small, $\frac{3}{4}$–2 in. long, of 2–8 spikelets; bracts usually 2, overtopping the panicle. Spikelets lanceolate, compressed, $\frac{1}{4}$ in. long, 2–4-flowered, varying in colour from whitish to dark chestnut-brown. Glumes 4–6, distichous, ovate-lanceolate, acuminate, keeled, nerveless except the midrib; margins glabrous; the 3 outer slightly smaller, empty. Hypogynous bristles 6, filiform, almost equalling the style. Stamens 3. Style-branches 3. Nut elliptic-oblong, trigonous with the angles thickened, smooth, polished, pale-brown.—*Cheesem. Man. N.Z. Fl.* (1906) 782. Chaetospora pauciflora *Hook. f. Fl. Nov. Zel.* i (1853) 273.

North and South Islands, Stewart Island: An abundant mountain-plant from Lake Taupo southwards. Usually from 1500 to 5500 ft., but descends to sea-level in Stewart Island and the south of Otago. December–March.

This hardly differs from the Chilian *Chaetospora antarctica* Hook. f., except in the much shorter leaves.

R.Sa. S. foliatus (Hk.f.) S.T. Blake. Proc. Roy. Soc. Qld. 51: 48 1940:

5. **S. axillaris** *Poir. Encycl. Suppl.* ii (1811) 251.—Stems very slender, pale-green, flaccid, leafy, branched, creeping or diffusely spreading, often intricate, 2–6 in. long or more. Leaves alternate, spreading, $\frac{1}{2}$–1 in. long, very narrow-linear, obtuse, flat or nearly so, flaccid. Spikelets 1–3 together in the axils of the leaves, sessile or shortly peduncled, about $\frac{1}{10}$ in. long, compressed, pale-brown, 1–2-flowered. Glumes distichous, lanceolate, subacute, keeled; the 2 or 3 outer empty and smaller. Hypogynous bristles 6, rarely fewer, longer than the nut. Stamens 3. Style-branches 3. Nut very small, elliptic-obovoid, obtusely trigonous, quite smooth, white or greyish-white.—*Hook. f. Handb. N.Z. Fl.* (1864) 298; *Benth. Fl. Austral.* vii (1878) 375; *Cheesem. Man. N.Z. Fl.* (1906) 788. Chaetospora axillaris *R. Br. Prodr.* (1810) 233; *Hook. f. Fl. Nov. Zel.* i (1853) 274, t. 62A; *Fl. Tasm.* ii (1860) 82. Scirpus foliatus *Hook. f. in Lond. Journ. Bot.* iii (1844) 414. Bot. Soc. Bot. Exch. Cl. 1941. 17: 124.

North and South Islands, Stewart Island, Chatham Islands: From the North Cape southwards, abundant in the North Island, less plentiful in the South Island. Sea-level to 2500 ft. November–March.

Easily recognized by the slender creeping or diffuse habit, leafy stems, spikelets in twos or threes in the axils of the leaves, and small white nut. Also common in extra-tropical Australia and Tasmania.

6. **S. apogon** *Roem. and Schult. Syst.* ii (1817) 77.—Stems very numerous, crowded, weak, slender, sometimes almost filiform, grooved, leafy at the base, 6–14 in. long. Leaves much shorter than the stems, narrow-linear, acute, almost flaccid, channelled in front, convex and striate on the back. Spikelets linear-lanceolate, chestnut-brown or almost black, $\frac{1}{8}$–$\frac{1}{6}$ in. long, 1–3-flowered, few or many together in irregular more or less compact umbels or heads, which are both terminal and lateral from the upper leaf-sheaths; bracts leafy. Glumes distichous, oblong-lanceolate, acute, keeled, almost black with narrow pale margins; the 3 outer empty, usually much smaller. Hypogynous bristles 6, not much exceeding the nut. Stamens 3. Style-branches usually 3. Nut small, broadly oblong-

obovoid, obtusely trigonous, conspicuously reticulated, white. — *Cheesem. Man. N.Z. Fl.* (1906) 783. S. Brownii *Hook. f. Handb. N.Z. Fl.* (1864) 298; *Benth. Fl. Austral.* vii (1878) 373. Chaetospora imberbis *R. Br. Prodr.* (1810) 233; *Hook. f. Fl. Nov. Zel.* i (1853) 274; *Fl. Tasm.* ii (1860) 82.

Var. **laxiflorus** *C. B. Clarke.* — Stems very slender, lax, sometimes 2 ft. long. Inflorescence much more lax; clusters mostly lateral; spikelets often long-peduncled. —S. laxiflorus *Steud. Cyp.* (1855) 166. S. vaccilans *T. Kirk in Trans. N.Z. Inst.* x (1878) 421.

North Island: Auckland—Cape Maria van Diemen and Tapotopoto Bay, *H. Carse!* Mangonui, *T. F. C.;* Puhipuhi, *T. Kirk;* Whangarei, *H. Carse!* vicinity of Auckland, *T. F. C., Petrie!* East Coast, *W. Colenso!* Var. *laxiflorus:* Between Taheke and Opaneke, *Petrie!* ravines near the base of Mount Wynyard, *T. Kirk!* between Te Aroha and Katikati, *Adams!* Taranaki—White Cliffs, *T. F. C.* South Island: Canterbury—Kowai Pass, *T. Kirk!* (the typical form). Sea-level to 2000 ft. December–March.

Common in eastern Australia, from Queensland to Tasmania.

7. **S. nitens** *Poir. Encycl. Suppl.* ii (1811) 251. — Rhizome slender, creeping. Stems densely tufted, slender, wiry, grooved, leafy at the base, 2–12 in. high. Leaves few, shorter than the stems, semiterete, deeply channelled in front, grooved on the back; sheaths chestnut-brown or blackish-brown, shining, grooved. Inflorescence a terminal head of 1–15 densely crowded and sessile spikelets; bracts $\frac{1}{2}$–1 in. long, exceeding the spikelets, continuous with the stem, so that the head appears lateral. Spikelets ovoid to lanceolate-ovoid, somewhat turgid, $\frac{1}{8}$–$\frac{1}{5}$ in. long, 2- or more rarely 3-flowered, chestnut-brown to blackish-brown. Glumes 4–6, obscurely distichous, broadly ovate, obtuse, concave, keeled, shining; the 2 or rarely the 3 outer smaller and empty. Hypogynous bristles 6, usually longer than the nut, plumose at the base with long hairs. Stamens 3. Style-branches 3. Nut ovoid, obscurely trigonous, smooth and shining, pale-brown to dark-brown.—*Hook. f. Handb. N.Z. Fl.* (1864) 299; *Benth. Fl. Austral.* vii (1878) 362; *Cheesem. Man. N.Z. Fl.* (1906) 783. S. Moorei *T. Kirk in Trans. N.Z. Inst.* xiii (1881) 384 (*not of Benth.*). Chaetospora nitens *R. Br. Prodr.* (1810) 233; *Hook. f. Fl. Nov. Zel.* i (1853) 274; *Fl. Tasm.* ii (1860) 82. Scirpus nitens *Boeck. in Linnaea,* xxxvi (1869–70) 696.

Var. **concinnus.**—Smaller, more rigid and wiry, 1–3 in. high. Spikelets solitary or rarely 2 together, slightly compressed, $\frac{1}{6}$–$\frac{1}{5}$ in. long, dark-brown or almost black. Nut rather larger, broadly ovoid, trigonous, sometimes scabrid at the tip.—S. concinnus *Hook. f. Handb. N.Z. Fl.* (1864) 299. Chaetospora concinna *Hook. f. Fl. Nov. Zel.* i (1853) 274, t. 62, f. B. Ascends to 4500 ft. on Ruapehu.

North and South Islands, Stewart Island: From Lake Taupo southwards, but often local. Sea-level to 2500 ft. December–March.

A most variable plant. Hooker's *S. concinnus* appears to me to be a depauperated state connected with the type by numerous intermediates, and I have consequently followed Mr. C. B. Clarke in reducing it to *S. nitens.* The typical form is not uncommon in Australia, ranging from Queensland to Tasmania and Western Australia.

9. CLADIUM P. Browne.

Perennial herbs. Stems stout or slender, terete or compressed, sometimes leafy throughout, sometimes at the base only, or the leaves reduced to sheathing scales. Leaves terete or compressed, more rarely vertically flattened and equitant at the base. Inflorescence paniculate. Spikelets numerous, rarely few, 1–3- or rarely 4–6-flowered, the lowest flower always perfect and fruit-bearing. Glumes imbricate all round, 1–4 outer empty,

smaller than the succeeding flowering ones. Hypogynous bristles usually wanting. Stamens 3. Style long, linear; base often dilated but continuous with the nut; style-branches 3, rarely 2. Nut ovoid or oblong, terete or obscurely trigonous or tricostate, smooth, crowned by the adnate base of the style.

Species between 40 and 50, widely distributed, but more plentiful in the Southern Hemisphere than in the Northern. Of the 10 species found in New Zealand, 6 extend to Australia and Tasmania, 3 of them being also found in the Pacific islands or eastern Asia; the remaining 4 are endemic.

taken up by G. stalk

A. Vincentia. *Spikelets with 2–4 perfect flowers. Nut stipitate, triquetrous, narrowed upwards into a long cuspidate beak.*

Tall, 2–5 ft. Stems and leaves flattened, the latter ½–1 in. broad. Panicle very large, lax, drooping .. .. 1. *C. Sinclairii.*

B. Baumea. *Spikelets with 1 or rarely 2 perfect flowers. Nut sessile, often tumid at the apex, not narrowed into a cuspidate beak.*

* Spikelets usually 2–3-flowered, 1 or sometimes 2 of the flowers perfecting fruit.

Stems and leaves flattened, ¼–½ in. broad. Panicle 6–12 in., narrow. Nut ovoid, trigonous .. .. 2. *C. complanatum.*
Stems and leaves stout, terete, transversely septate. Panicle very large and broad, drooping. Nut obovoid, trigonous .. .. 3. *C. articulatum.*
Stems and leaves slender, terete, not septate. Panicle narrow, erect, 3–10 in. long, interrupted; bracts spathaceous. Nut reddish-yellow, trigonous .. .. 4. *C. glomeratum.*
Stems and leaves slender, terete, not septate. Panicle narrow, 10–18 in.; branches drooping. Nut pale .. .. .. 5. *C. Huttoni.*

** Spikelets 1- or rarely 2-flowered, never more than one flower perfecting fruit.

Stems and leaves slender, terete. Panicle 2–6 in. long, stiff, dense; bracts small. Nut small, oblong-orbicular .. .. .. 6. *C. teretifolium.*
Stems very slender, terete. Leaf solitary and long, or reduced to sheathing scales. Panicle 6–18 in. long, slender. Nut ovoid, smooth; tip large, tumid .. .. 7. *C. Gunnii.*
Stems terete. Leaves reduced to sheathing scales. Panicle short, ½–1½ in. long. Nut obtusely trigonous, tip small, puberulous .. 8. *C. junceum.*
Stems stout, tetragonous. Leaves like the stems, short, often reduced to sheathing scales. Panicle contracted into a spike ⅓–½ in. long. Hypogynous bristles present .. .. 9. *C. Vauthiera.*
Stems filiform. Leaves reduced to sheathing scales. Panicle short, ½–¾ in. long; spikelets 3–7. Nut with a persistent style-base as long as itself .. .. 10. *C. capillaceum.*

v. anceps Hk. f.

1. **C. Sinclairii** *Hook. f. Handb. N.Z. Fl.* (1864) 305.—Stems tall, leafy, quite flat, smooth, 2–5 ft. high, ¼ in. diam., forming large clumps. Leaves 2–4 ft. long, distichous and equitant at the base, acuminate, quite flat, ½–1 in. broad, pale-green, smooth, striate; margins thin, even. Panicle large, terminal, nodding, excessively branched, 9–12 in. long or more; bracts sheathing, 2-edged; branches drooping. Spikelets innumerable, rich dark red-brown, fascicled, ⅛ in. long, 2–3-flowered, the lower flower usually alone fertile. Glumes usually 5, ovate-lanceolate, acuminate or almost awned, minutely scabrid-pubescent, 2 or 3 outer empty. Hypogynous bristles wanting. Stamens 3, elongating after flowering. Style-branches 3. Nut small, red-brown, fusiform, trigonous, conspicuously narrowed at the base, and also upwards into a triquetrous minutely scabrid beak.—*Cheesem. Man. N.Z. Fl.* (1906) 785; *Ill. N.Z. Fl.* ii (1914) t. 211. C. gahnioides *Col. in Trans. N.Z. Inst.* xvi (1884) 340. Vincentia anceps *Hook. f. Fl. Nov. Zel.* i (1853) 276. V. gladiata *Boeck. in Linnaea*, xxxviii (1874) 250.

Scirpus anceps. Sol. in L. p. 76.

North Island: From the North Cape southwards to Taupo, Hawke's Bay, the Wanganui River, and the Ruahine and Kaimanawa Mountains, not uncommon on cliffs, bank-sides, &c. Sea-level to 2500 ft. October–January.

A handsome species, remarkable for the broad flat leaves. When out of flower it might easily be mistaken for an iridaceous plant. Mr. Colenso's *C. gahnioides* is absolutely indistinguishable from the type.

2. **C. complanatum** *Berggr. in Minnesk. Fisiog. Sallsk. Lund.* (1877) 23, t. 6, f. 1–5.—Stems tall, rather stout, compressed and 2-edged, smooth, finely striate, 2–4 ft. high, $\frac{1}{4}$ in. diam. at the base. Leaves about the length of the stem, distichous and equitant at the base, narrow-ensiform, acuminate, flat or slightly convex, $\frac{1}{4}$–$\frac{1}{2}$ in. broad, pale-green, smooth, striate; margins even, not scabrid. Panicle long and narrow, 6–12 in., much branched; branches fascicled, erect; bracts sheathing, with ciliate margins. Spikelets numerous, chestnut-brown, $\frac{1}{6}$–$\frac{1}{5}$ in. long, ovate-oblong, 2–3-flowered, 1 or 2 of the flowers fertile. Glumes usually 5, ovate, acuminate, striate; margins ciliate; 2 or 3 outer empty. Stamens 3. Style-branches 3. Nut almost sessile, ovoid, trigonous, puberulous, pale-chestnut, narrowed upwards into a rather stout pyramidal beak.—*Cheesem. Man. N.Z. Fl.* (1906) 785; *Ill. N.Z. Fl.* ii (1914) t. 210.

North Island: Auckland—Ohaeawai and Taheke, *Berggren!* Puhipuhi Forest, *T. Kirk!* Maungatapere, *H. Carse!* September–November.

Apparently a very local plant, not yet found outside the Bay of Islands and Whangarei Counties.

3. **C. articulatum** *R. Br. Prodr.* (1810) 237.—Stems tall and stout, terete, transversely septate, 3–6 ft. high. Leaves long, almost equalling the stems, terete, the transverse septa usually very distinct; sheaths large and long, pale; tip subulate, acute, pungent. Panicle large, lax, terminal, much branched, drooping, 9–18 in. long; branches numerous, closely placed; bracts sheathing, the lowest with a terete septate lamina $\frac{1}{2}$–$1\frac{1}{2}$ in. long. Spikelets excessively numerous, rich red-brown, $\frac{1}{6}$ in. long, 2–4-flowered, but usually only one flower is fertile. Glumes 4–7, ovate or ovate-lanceolate, acuminate, keeled, membranous, puberulous, the 2 outer empty. Stamens 3. Style-branches 3. Nut broadly obovoid, trigonous with the angles thick and corky, red-brown; beak short, umbonate.—*Hook. f. Fl. Nov. Zel.* i (1853) 276; *Handb. N.Z. Fl.* (1864) 304; *Benth. Fl. Austral.* vii (1878) 403; *Cheesem. Man. N.Z. Fl.* (1906) 786. Baumea loculata *Boeck. in Linnaea*, xxxviii (1874) 243. Gahnia articulata *F. Muell. Second Census Austral. Pl.* (1889) 216.

North Island: Margins of lakes and ponds from the North Cape to Taupo and Hawke's Bay, not uncommon. Sea-level to 1800 ft. November–January.

Also in Australia, New Caledonia, and the New Hebrides. Small states sometimes have the stems and leaves obscurely septate.

4. **C. glomeratum** *R. Br. Prodr.* (1810) 237.—Stolons creeping, clothed with pale striated scales. Stems tufted, terete and rush-like, slender, rather soft, 1–3 ft. high. Leaves few from the base of the stem, long, terete, with acute subulate tips. Panicle contracted, 3–10 in. long; lower branches distant, usually long and narrow, erect; upper closer together, shorter and broader; primary bracts large and sheathing, almost spathaceous, reddish-brown. Spikelets numerous, fascicled, red-brown, $\frac{1}{6}$–$\frac{1}{5}$ in. long, ovate-oblong, 2–3-flowered, 1 or rarely 2 of the flowers fertile. Glumes usually 5, ovate, acuminate, membranous, striated; margins ciliate; 2–3

C. rubiginosum (Sol. ex Forst. f.) Dom. 1916. 615
Domin. 1915
Bibliothec. Bot. 85 (1915) 476

outer ones empty. Stamens 3. Style-branches 3. Nut elliptic-oblong when mature, obtusely trigonous, smooth and polished, reddish or reddish-yellow; tip tumid, acute, pubescent.—*Hook. f. Fl. Nov. Zel.* i (1853) 275; *Fl. Tasm.* ii (1860); *Handb. N.Z. Fl.* (1864) 304; *Cheesem. Man. N.Z. Fl.* (1906) 786. Schoenus rubiginosus *Forst. f. Prodr.* (1786) n. 493 (*name only*). Fuirena rubiginosa *Spreng. Fl. Hal. Mant.* (1807) 29; *A. Cunn. Precur.* (1836) n. 271; *Raoul Choix* (1846) 40. Baumea rubiginosa *Boeck. in Linnaea*, xxxviii (1874) 241.

North and South Islands, Stewart Island, Chatham Islands: Swampy places, margins of lakes, &c., plentiful in the North Island, less common in the South Island. Sea-level to 2000 ft. November–January.

Best distinguished by the narrow interrupted panicle, broad spathaceous bracts, and 2–3-flowered spikelets. It extends to Australia and Tasmania, the Malay Archipelago, and northwards to China and Japan.

5. **C. Huttoni** *T. Kirk in Trans. N.Z. Inst.* ix (1877) 551.—Stems tufted, slender, terete, rather wiry, striate, 3–5 ft. high. Leaves few towards the base of the stem, long, terete, striate; tips subulate, acute. Panicle elongated, rather lax, drooping, 10–18 in. long; lower branches remote, solitary or fascicled, 3–6 in. long or more; bracts large and sheathing, membranous, acuminate. Spikelets numerous, fascicled, brown, $\frac{1}{8}$–$\frac{1}{6}$ in. long, 2–5-flowered, rarely more than 2 of the flowers fertile. Glumes 4–7, ovate, acuminate, membranous, striated; margins ciliate. Stamens 3 or rarely 2. Style-branches 3. Nut small, oblong, obtusely trigonous, smooth when mature, pale; beak very small.—*Cheesem. Man. N.Z. Fl.* (1906) 787.

North Island: Auckland—Mongonui County, in swamps near the sea, not uncommon, *H. Carse!* Whangape, Waikare, Waihi, and other lakes in the Middle Waikato, *T. Kirk! T. F. C.*; Lake Tikitapu, Lake Taupo, *T. Kirk! T. F. C.* Sea-level to 1600 ft. December–February.

Very close to *C. glomeratum*, but distinguished by the larger size, longer panicle with drooping branches, smaller many-flowered spikelets, and smaller paler nut.

6. **C. teretifolium** *R. Br. Prodr.* (1810) 237.—Stems densely tufted, terete or slightly compressed, rush-like, firm, striate, 1–3 ft. high. Leaves few at the base of the stem, long, terete except towards the sharp subulate tip, which is often obscurely 3–4-angled; sheaths rather loose. Panicle oblong, 2–6 in. long, much branched, dense; lower branches closely placed, not distant as in *C. glomeratum*; bracts short. Spikelets very numerous, fascicled, dark-brown, $\frac{1}{6}$ in. long, 1- or rarely 2-flowered, but in the latter case the upper flower is sterile. Glumes ovate, acuminate or awned, membranous, ciliate or almost glabrous, the 2 or 3 outer empty. Stamens 3. Style-branches 3. Nut very small, oblong-orbicular, not trigonous, corky, conspicuously corrugated; beak very minute, smooth.—*Hook. f. Fl. Nov. Zel.* i (1853) 276; *Handb. N.Z. Fl.* (1864) 304; *Benth. Fl. Austral.* vii (1878) 406; *Cheesem. Man. N.Z. Fl.* (1906) 787.

North Island: Abundant in swamps from the North Cape to Hawke's Bay and Taranaki. South Island: Aorere Valley, *T. Kirk!* near Westport, *W. Townson!* Hokitika, *T. Kirk!* Franz Josef Glaćier, *Cockayne!* Canterbury, *J. B. Armstrong!* Southern Alps, *Sinclair* and *Haast* (Handbook). Sea-level to 2000 ft. November–January.

This has the habit and general appearance of *C. glomeratum*, but the stems and leaves are firmer, the panicle shorter and much more dense, bracts smaller, spikelets usually 1-flowered, and nut very different. It is also found in eastern Australia and Tasmania.

also see Blake 1943.
c. tenax (Hk.f.) Bruce 1916 : 615.

7. **C. Gunnii** *Hook. f. Fl. Tasm.* ii (1860) 95, t. 148B.—Stems densely tufted, rush-like, very slender, terete, rigid and wiry, 9 in. to 3 ft. high. Leaves sometimes wholly reduced to sheathing scales at the base of the stem, but usually 1 long terete stem-like leaf with 2–3 sheaths below it; tip subulate, pungent; sheaths long, purplish-red. Panicle elongate, narrow, interrupted, 6–18 in. long; branches remote, slender, erect, the lowest sometimes 6 in. long in large specimens, in small ones reduced to 1 in.; bracts closely sheathing, with a short erect lamina. Spikelets not fascicled, distinct, sessile, 1-flowered. Glumes usually 3, lanceolate, acuminate, the 2 lowest empty; the uppermost fertile, longer and narrower than the others, and spreading in fruit; margins involute. Stamens 3. Style-branches 3. Nut pedicelled, ovoid or oblong-ovoid, smooth and shining when mature, 3-ribbed when young, tip large and tumid, pale-yellow with dark base and tip.—*Hook. f. Handb. N.Z. Fl.* (1864) 304; *Benth. Fl. Austral.* vii (1878) 407; *Berggr. in Minnesk. Fisiog. Sallsk. Lund.* (1877) 24, t. 6, f. 6–11; *Cheesem. Man. N.Z. Fl.* (1906) 788. C. laxiflorum *Hook. f. Fl. Tasm.* ii (1860) 95, t. 148A. Lampocarya tenax *Hook. f. Fl. Nov. Zel.* i (1853) 277.

North and South Islands, Stewart Island: From the North Cape southwards, not uncommon. Sea-level to 2500 ft. December–February.

Also in eastern Australia and Tasmania. In fruit the margins of the upper part of the flowering glume become strongly involute, firmly enclosing the 3 persistent stamens, which remain attached to the pedicel of the ripe nut. The nut is thus frequently detained swinging from the spikelet long after it has separated from the point of attachment.

8. **C. junceum** *R. Br. Prodr.* (1810) 237.—Rhizome stout, woody, creeping, clothed with pale-brown scales. Stems tufted, rigid, erect, terete, rush-like, 1–2 ft. high. Leaves reduced to 1 long and closely appressed sheath with a minute vertically flattened lamina, below which are 1 or 2 much shorter sheaths. Panicle short, spike-like, sparingly branched, ½–1½ in. long; bract at the base very small. Spikelets red-brown, ⅛ in. long, 1–2-flowered, the lower flower alone fertile. Glumes 4–5, oblong-ovate, acute, membranous, keeled, puberulous, the 2 or 3 outer empty. Stamens 3. Style-branches 3. Nut oblong-ovoid, obscurely trigonous, dark-brown, surface rough; beak small, tumid, puberulous.—*Hook. f. Fl. Tasm.* ii (1860) 95; *Handb. N.Z. Fl.* (1864) 305; *Benth. Fl. Austral.* vii (1878) 408; *Cheesem. Man. N.Z. Fl.* (1906) 788. Lepidosperma striatum *Hook. f. Fl. Nov. Zel.* i (1853) 279 (*not of R. Br.*). L. Colensoi *Boeck. in Linnaea*, xxxviii (1874) 328. Schoenus marginiculatus Soland. m.s. p.61.

Var. **elatior** *H. Carse in Trans. N.Z. Inst.* xlviii (1916) 240.—Culms much longer, 3–5 ft. high. Panicles 2–4 in. long, much more branched than in the type. In shaded woods at Tauroa, Mongonui County, *H. Carse!*

North and South Islands: From the North Cape to the Bluff, not uncommon, especially in the North Island, often in brackish-water swamps. Sea-level to 2000 ft. November–January.

Also throughout the greater part of Australia and in New Caledonia.

c. australe (a. Rich) Bruce 1916 : 615

9. **C. Vauthiera** *C. B. Clarke in Cheesem. Man. N.Z. Fl.* (1906) 788.—Rhizome short, stout, creeping. Stems densely tufted, rather stout, conspicuously 4-angled, smooth, wiry, rigid, 9–18 in. high. Leaves 1 or 2 like the stems, 2–10 in. long, sometimes reduced to sheathing scales. Panicle contracted into a dense oblong spike-like head ⅓–½ in. long, subtended by a

Vauthiera

rigid sheathing bract terminated by a subulate erect point. Spikelets few, densely compacted, $\frac{1}{6}$ in. long, 1-flowered. Glumes 5–6, ovate-lanceolate, acute or acuminate, coriaceous, puberulous, the terminal one subtending the flower, the remainder all empty. Hypogynous scales 6, small, white, triangular, connate into a 6-lobed cup. Stamens 3. Style-branches 3. Nut broadly oblong, obtusely trigonous, smooth, red-brown; beak short, ovoid-conic, pubescent.—Vauthiera australis *A. Rich. Fl. Nouv. Zel.* (1832) 107, t. 20; *A. Cunn. Precur.* (1836) n. 276; *Raoul Choix* (1846) 40. Lepidosperma australe *Hook. f. Fl. Nov. Zel.* i (1853) 279. L. tetragonum *Hook. f. Handb. N.Z. Fl.* (1864) 307 (*not of Labill.*).

North and South Islands, Stewart Island: Not uncommon throughout. Sea-level to 2000 ft. November–January.

This differs from *Lepidosperma*, to which it was referred by Hooker, in always wanting the sterile flower below the fruit-bearing one. I have followed Mr. Clarke's suggestion in placing it in *Cladium*, notwithstanding the presence of hypogynous bristles. It is endemic in New Zealand.

10. **C. capillaceum**, *C. B. Clarke in Cheesem. Man. N.Z. Fl.* (1906) 789.—Rhizome short, creeping. Stems densely tufted, very slender, filiform, wiry, terete, finely striate, 9–18 in. high. Leaves reduced to a single closely appressed purplish-red sheath, usually with a very minute erect scale-like lamina at the tip. Panicle terminal, very small, slender, $\frac{1}{2}$–$\frac{3}{4}$ in. long, of from 3 to 7 spikelets. Spikelets narrow, obscurely distichous, $\frac{1}{8}$–$\frac{1}{6}$ in. long, 1-flowered. Glumes usually 5, ovate-lanceolate, awned, membranous, the 3 outer empty. Stamens 3. Style-branches 3. Nut oblong-ovoid, 3-ribbed, pale, smooth, crowned by the long and narrow pubescent style-base, which is as long as the nut itself.—Chaetospora capillacea *Hook. f. Fl. Tasm.* ii (1860) 81, t. 141A (*not of Nees*). C. capillaris *F. Muell. Fragm. Phyt. Austral.* ix (1875) 34. Elynanthus capillaceus *Benth. Fl. Austral.* vii (1878) 377. Schoenus capillaris *F. Muell. Second Census Austral. Pl.* (1889) 215. S. tenuis *T. Kirk in Trans. N.Z. Inst.* i, ed. ii (1871) 94.

North Island: From the North Cape southwards, not uncommon. South Island: Near Westport, *W. Townson!* Sea-level to 2000 ft. December–February.

Also found in Victoria and Tasmania. The narrow elongated persistent style-base gives the nut a different appearance to that of any other New Zealand species.

10. **LEPIDOSPERMA** Labill.

Perennial herbs. Stems stout, leafy at the base, often flat or compressed. Leaves similar to the stems, sheathing at the base. Inflorescence a terminal panicle, either long and much branched, or short and spike-like. Spikelets numerous, 2–4-flowered, the uppermost flower perfect and fruit-bearing, the remainder sterile. Glumes 5–10, subdistichous, imbricate; outer 1–6 empty. Hypogynous bristles 6, short, ovate or lanceolate with a setiform tip. Stamens 3. Style-branches 3. Nut ovoid or oblong, obtusely trigonous; tip obtuse, indurated, smooth.

Species 40. One of them is endemic in South China and Malacca, the remaining 35 are confined to Australia, with the exception of two which are found in New Zealand as well.

Stems flat and thin. Panicle narrow, lax, 4–12 in. long	1. *L. laterale.*
Stems slender, terete. Spike simple, 1–3 in. long	2. *L. filiforme.*

1. **L. laterale** *R. Br. Prodr.* (1810) 234. — Stems densely tufted, flat or very slightly convex, with sharp almost cutting edges, smooth, firm, 2–4 ft. high, $\frac{1}{5}$–$\frac{1}{4}$ in. broad. Leaves 3–5, similar to the stems but shorter, equitant at the base. Panicle long and narrow, 4–12 in. long; branches not very closely placed, elongated, erect, simple or again branched, lowest bract with an erect lamina $1\frac{1}{2}$–4 in. long, upper bracts short. Spikelets sessile, red-brown, $\frac{1}{5}$ in. long, usually with 1 perfect flower and 1 sterile one below it. Glumes ovate, acuminate or almost awned, keeled, minutely puberulous on the back, the 3 outer empty. Hypogynous bristles 6, connate at the base, small, short, tipped with delicate fragile setae which are sometimes $\frac{1}{2}$ as long as the nut. Stamens 3. Style-branches 3. Nut ovoid-oblong, obtusely trigonous, smooth when fully mature, tip tumid.—*Benth. Fl. Austral.* vii (1878) 393; *Cheesem. Man. N.Z. Fl.* (1906) 790. L. concavum *Hook. f. Fl. Tasm.* ii (1860) 91, t. 146B; *Handb. N.Z. Fl.* (1864) 307 (*not of R. Br.*). L. longitudinalis *Hook. f. Fl. Nov. Zel.* i (1853) 279 (*not of Labill.*).

North Island: Auckland—Clay hills from the North Cape to the Upper Waikato, not uncommon. Sea-level to 1500 ft. January–February.

Also in eastern Australia and Tasmania.

2. **L. filiforme** *Labill. Pl. Nov. Holl.* i (1806) 17, t. 15. — Rhizome short, stout, woody, creeping. Stems numerous, densely tufted, slender but rigid, erect, terete, rush-like, 1–3 ft. high. Leaves reduced to a rather long and closely appressed sheath, terminating in a short and almost filiform erect lamina. Spike simple, terminal, 1–3 in. long; rhachis slender, straight or scarcely flexuose; sheathing bracts narrow. Spikelets 1 to each bract, narrow-linear, terete or nearly so, $\frac{1}{3}$ in. long, 2-flowered, the upper flower perfect, the lower sterile. Glumes 4–5, narrow-lanceolate, acute, the 2 or 3 outer ones shorter and broader, empty. Stamens 3. Nut oblong, obtuse or minutely apiculate, obtusely trigonous with a thickened line down the angles. Hypogynous scales at the base of the nut minute, whitish, subulate-lanceolate, acute, closely appressed.—*Hook. f. Fl. Tasm.* ii (1860) 93 (*in part*); *F. Muell. Fragm. Phyt. Austral.* ix (1875) 27; *Benth. Fl. Austral.* vii (1878) 399; *Cheesem. Man. N.Z. Fl.* (1906) 790.

North Island: Auckland—Clay hills between Mangonui and Kaitaia, and near Rangaunu Harbour, *H. Carse!* August–September.

I am indebted to Mr. C. B. Clarke for identifying this with the Australian *L. filiforme*. So far, it has only been gathered in New Zealand by Mr. Carse, but it will probably prove to be not uncommon north of Auckland. In Australia it has been recorded from Victoria and Tasmania.

11. GAHNIA Forst. 1776

Tufted perennial herbs, usually of large size. Stems tall and stout, leafy throughout their length. Leaves usually long, very coarse and harsh, narrowed into long subulate or filiform points; margins involute, scabrid. Panicle large, terminal; sometimes broad and effuse, with drooping branches; sometimes narrower and more erect. Spikelets clustered, black or dark-brown, 1–2-flowered; the upper flower hermaphrodite and fruit-bearing; the lower flower sterile or male. Glumes many, imbricated all round; the outer 2–5 or more empty, keeled, often mucronate; flowering glumes minute at first, but enlarging in fruit. Hypogynous bristles wanting. Stamens usually 4 in the hermaphrodite

GAHNIA

1. Nut = 6 mm. 2
   Nut = 4 mm. 4
2. Nut black . . . . . xanthocarpa
   Nut red-brown 3
3. Glumes 8; 5 empty unequal . . . . pauciflora
   Glumes 4; 2 empty very long . . . . procera
4. Nut red-brown 5
   Nut black 6
5. Panicle nodding . . . . . setifolia
   Panicle rigid, erect . . . . . rigida
6. Panicle rigid, erect; glumes 8, 5 empty subequal . . . . . robusta
   Panicle slender, narrow; glumes 4-5, 2-3 empty . . . . . lacera

distant. Glumes 8; 5 empty, unequal. Fruit large, $\frac{1}{5}$–$\frac{1}{4}$ in., red-brown .. .. 3. *G. pauciflora.*

Very tall and stout, 5–12 ft. Panicle 2–5 ft., nodding. Glumes 6–7; 4–5 empty, subequal. Nut large, $\frac{1}{5}$–$\frac{1}{4}$ in., black when fully ripe .. .. 4. *G. xanthocarpa.*

Tall and stout, 5–7 ft. Panicle 2–3 ft., rigid, erect. Glumes 8; 5 empty, subequal. Nut small, $\frac{1}{6}$ in., black .. .. 5. *G. robusta.*

Leafy, 2–4 ft. Panicle 1–1$\frac{1}{2}$ ft., narrow, lax. Glumes 4; 2 empty, very long. Nut large, $\frac{1}{4}$ in., red-brown .. .. .. 6. *G. procera.*

Slender, 2–4 ft. Panicle 9–18 in., slender, narrow but dense. Glumes 4–5; 2–3 empty. Nut small, $\frac{1}{6}$ in., black .. .. 7. *G. lacera.*

Small, 6–14 in. Leaves exceeding the stem, spreading. Glumes 6; 4 empty. Nut small, ovoid, apiculate, black .. .. 8. *G. gahniaeformis.*

1. **G. setifolia** *Hook. f. Fl. Nov. Zel.* i (1853) 278.—Stems numerous, tall, stout, 3–7 ft. high, forming large tussocks. Leaves many, almost as long as the stems, involute, with scabrid cutting edges and long filiform points. Panicle large, nodding, 1–3 ft. long, much and laxly branched; branches long, erect in flower, drooping in fruit; bracts long and leafy, with scabrid filiform points. Spikelets very numerous, dark-brown or almost black, $\frac{1}{6}$–$\frac{1}{5}$ in. long, 2-flowered; the lower flower male, the upper hermaphrodite and fruit-bearing. Glumes 7–8; the 4–5 outer ones empty, gradually increasing in length, keeled, acuminate, minutely scaberulous; the 3 upper very small at the time of flowering and concealed within the uppermost empty glume, enlarged in fruit and closely appressed to the nut, obtuse, convolute. Stamens usually 4 to each flower, but varying from 4 to 6; filaments greatly elongated in fruit. Style-branches 3, rarely 4. Nut small, $\frac{1}{6}$ in. long, elliptic-obovoid, narrowed at both ends, smooth and shining, indistinctly grooved, red-brown when fully ripe, transversely grooved within.—*Hook. f. Handb. N.Z. Fl.* (1860) 306; *Cheesem. Man. N.Z. Fl.* (1906) 792; *C. B. Clarke Ill. Cyp.* (1909) t. xcviii, f. 1–7. G. scaberula, G. parviflora, *and* G. multiglumis *Col. in Trans.*

long and closely appressed sheath, terminating in a short and almost filiform erect lamina. Spike simple, terminal, 1–3 in. long; rhachis slender, straight or scarcely flexuose; sheathing bracts narrow. Spikelets 1 to each bract, narrow-linear, terete or nearly so, $\frac{1}{3}$ in. long, 2-flowered, the upper flower perfect, the lower sterile. Glumes 4–5, narrow-lanceolate, acute, the 2 or 3 outer ones shorter and broader, empty. Stamens 3. Nut oblong, obtuse or minutely apiculate, obtusely trigonous with a thickened line down the angles. Hypogynous scales at the base of the nut minute, whitish, subulate-lanceolate, acute, closely appressed.—*Hook. f. Fl. Tasm.* ii (1860) 93 (*in part*); *F. Muell. Fragm. Phyt. Austral.* ix (1875) 27; *Benth. Fl. Austral.* vii (1878) 399; *Cheesem. Man. N.Z. Fl.* (1906) 790.

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flower, often 4–6 in the male flower; filaments greatly elongated after flowering, and often holding the nut. Nut hard and bony, ellipsoid or ovoid or obovoid, obscurely trigonous or terete, red or reddish-brown or black.

Species about 35, most of them natives of Australia and New Zealand, but extending through the Pacific islands to the Sandwich Islands and Malay Archipelago. Of the 8 found in New Zealand, one occurs in Lord Howe Island and another in the Sandwich Islands, the remaining 6 are endemic. The genus is remarkable for the extraordinary extent to which the filaments lengthen after flowering. In *G. procera* they are often quite 2 in. long, or from 8 to 10 times the length of the flowering glumes. They generally remain attached to the base of the nut after it has fallen away, and as the other end of the filament is usually entangled with the glumes or with the filaments of other flowers the nut remains swinging by the filaments quite free from the spikelet. Mr. Colenso (Trans. N.Z. Inst. xviii (1886) 281) has suggested that some of these filaments are in reality hypogynous scales, giving as a reason for this belief that in his *G. scaberula* and *G. exigua* he has noticed within the same flower stamens with the filaments still very short, and filaments already lengthened to the full extent. He failed to notice that the lower male flower expands long before the hermaphrodite flower placed just above it, so that its filaments have lost their anthers and lengthened long before the expansion of the upper flower takes place. The two flowers are placed so close together that it is quite easy to take the two for one.

Tall, 3–7 ft. Panicle 1–3 ft., nodding. Glumes 7–8; 4–5 empty, unequal. Nut small, $\frac{1}{6}$ in., red-brown	1. *G. setifolia.*
Smaller, 2–4 ft. Panicle 1½–2½ ft., rigid, erect. Glumes 6–7; 3–4 empty, subequal. Nut small, $\frac{1}{6}$ in., red-brown	2. *G. rigida.*
Slender, 2–4 ft. Panicle 1½–2½ ft., narrow, elongate, branches distant. Glumes 8; 5 empty, unequal. Fruit large, $\frac{1}{5}$–$\frac{1}{4}$ in., red-brown	3. *G. pauciflora.*
Very tall and stout, 5–12 ft. Panicle 2–5 ft., nodding. Glumes 6–7; 4–5 empty, subequal. Nut large, $\frac{1}{5}$–$\frac{1}{4}$ in., black when fully ripe	4. *G. xanthocarpa.*
Tall and stout, 5–7 ft. Panicle 2–3 ft., rigid, erect. Glumes 8; 5 empty, subequal. Nut small, $\frac{1}{6}$ in., black	5. *G. robusta.*
Leafy, 2–4 ft. Panicle 1–1½ ft., narrow, lax. Glumes 4; 2 empty, very long. Nut large, $\frac{1}{4}$ in., red-brown	6. *G. procera.*
Slender, 2–4 ft. Panicle 9–18 in., slender, narrow but dense. Glumes 4–5; 2–3 empty. Nut small, $\frac{1}{6}$ in., black	7. *G. lacera.*
Small, 6–14 in. Leaves exceeding the stem, spreading. Glumes 6; 4 empty. Nut small, ovoid, apiculate, black	8. *G. gahniaeformis.*

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N.Z. Inst. xviii (1886) 278–80. Lampocarya setifolia *A. Rich. Fl. Nouv. Zel.* (1832) 111; *A. Cunn. Precur.* (1836) n. 282; *Raoul Choix* (1846) 40.

North Island: Abundant throughout, mainly in light forest or scrub. South Island: Marlborough—Picton, *J. Rutland!* Sea-level to 2000 ft. December–January.

2. **G. rigida** *T. Kirk in Trans. N.Z. Inst.* ix (1877) 551.—Stems densely tufted, harsh and rigid, erect, 2–4 ft. high. Leaves equalling the stems, with involute scabrid margins and very long drooping filiform points. Panicle stiff, erect, rather narrow, elongate, 1½–2½ ft. long; branches numerous, short, strict, erect; bracts with dark sheaths and long filiform points. Spikelets numerous, crowded, dark-brown or almost black, ⅕–¼ in. long, 2-flowered; the lower flower male, the upper hermaphrodite and fruit-bearing. Glumes 6–7; the 3–4 outer empty, almost equal in length, keeled, narrowed into long acuminate points, scaberulous on the keel, margins paler, membranous; the 3 inner small at the time of flowering, enlarged in fruit, convolute, obtuse. Stamens 4–5 in each flower; filaments greatly elongated in fruit. Style-branches 3. Nut small, ⅙ in. long, oblong-obovoid, smooth, brown, or brown mottled with red and black.—G. exigua *Col. in Trans. N.Z. Inst.* xviii (1886) 279.—*Cheesem. Man. N.Z. Fl.* (1906) 792.

South Island: Nelson—Dun Mountain, *T. F. C.;* Aorere Valley and Ngakawau, *T. Kirk;* Westport, *W. Townson!* Westland—Between Hokitika and Ross, Marsden, near Greymouth, *T. Kirk!* southwards to the Waiho River and the Franz Josef Glacier, *Cockayne.* Sea-level to 2500 ft.

Distinguished from *G. setifolia* by the usually smaller size, erect rigid panicle, longer and more acuminate subequal glumes, and more obovoid nut. The erect compact panicle, subequal glumes, and small nut separate it from the following species.

3. **G. pauciflora** *T. Kirk in Trans. N.Z. Inst.* i, ed. 2 (1871) 94.—Stems slender, sparingly leafy, 2–3 ft. high, rarely more. Leaves equalling the stems, narrow, with scabrid cutting edges and long filiform points. Panicle long, lax but narrow, 1½–3 ft. long; branches distant, slender; bracts long, leafy. Spikelets loosely scattered on the branches of the panicle, not crowded, sessile or shortly pedicelled, brownish-black, ⅕–¼ in. long, 2-flowered; lower flower male, upper hermaphrodite and fruit-bearing. Glumes usually 8; the 5 lower ones empty, gradually increasing in size, ovate, acute or acuminate; the 3 upper small at first, but enlarging in fruit, deeply concave, appressed to the nut, obtuse. Stamens 4–5 to each flower; filaments greatly elongated in fruit. Style-branches 3–4. Nut large, ⅕–¼ in. long, elliptic-ovoid, acute at both ends, smooth and shining, often grooved on the inner face, red-brown with a dark tip, transversely grooved within.—*Cheesem. Man. N.Z. Fl.* (1906) 793; *C. B. Clarke Ill. Cyp.* (1909) t. xcvii, f. 6. G. Hectori *T. Kirk in Trans. N.Z. Inst.* ix (1877) 551.

North and South Islands: From the North Cape southwards to Marlborough, Nelson, and Westland, plentiful. Sea-level to 3000 ft. October–December.

A well-marked species, at once recognized by the slender elongated panicle, with lax distant branches; the numerous empty glumes, the lower of which are unusually small; and the large red-brown nut.

4. **G. xanthocarpa** *Hook. f. Handb. N.Z. Fl.* (1864) 306.—Stems numerous, stout, often as thick as the finger, densely tufted, leafy, 5–12 ft. high, forming huge clumps in forests. Leaves numerous, very long, ½ in. broad or more, involute, scabrid on the margins and veins, upper part

produced into long filiform points. Panicle very large, 2–5 ft. long, drooping, excessively branched; branches long, slender, pendulous, 9–18 in. long or even more; bracts long, leafy. Spikelets innumerable, densely crowded, brown, $\frac{1}{5}$–$\frac{1}{4}$ in. long, 2-flowered; lower flower male, upper flower hermaphrodite and fruit-bearing. Glumes 6–7; the 3–4 outer empty, not very different in length, ovate, shortly acuminate; the 3 upper smaller, deeply concave, obtuse. Stamens usually 4 to each flower; filaments lengthening much in fruit. Style-branches 3–4. Nut large, $\frac{1}{5}$–$\frac{1}{4}$ in. long, elliptic-oblong or -obovoid, acute at both ends, smooth and shining, sometimes indistinctly grooved, black when fully ripe, yellowish when immature, transversely grooved within.—*Benth. Fl. Austral.* vii (1878) 418; *Cheesem. Man. N.Z. Fl.* (1906) 793. G. ebenocarpa *Hook. f. ex T. Kirk in Trans. N.Z. Inst.* i (1869) 149. Lampocarya xanthocarpa *Hook. f. Fl. Nov. Zel.* i (1853) 278. Cladium xanthocarpum *F. Muell. Fragm. Phyt. Austral.* ix (1875) 13.

North Island: Not uncommon in forests throughout. South Island: Marlborough—*J. Rutland!* Nelson—Motueka Valley, *T. F. C.*; Westport, *W. Townson!* Westland—Hokitika, *T. Kirk!* Martin's Bay, *Poppelwell* and *Thomson!* Canterbury—*Haast, J. B. Armstrong.* Sea-level to 2500 ft. February–March.

The finest species of the genus, at once identified by its large size, enormous panicles, and large black nut. It forms a marked constituent of almost all forest districts in the North Island, particularly in the kauri forests, and also extends along the west coast of the South Island as far as Martin's Bay. It is apparently not uncommon in Lord Howe Island.

5. **G. robusta** *T. Kirk in Trans. N.Z. Inst.* xxvi (1894) 261.—Stems robust, as thick as the little finger, 6–7 ft. high. Leaves almost as long as the stems, involute, with scabrid margins and long filiform points. Panicle large, 2–3 ft. long, dense, narrow, erect; branches 5–10 in. long, strict, erect; bracts leafy, with long filiform points. Spikelets crowded, dark-brown or almost black, 2-flowered; lower flower male, upper hermaphrodite and fruit-bearing. Glumes usually 7; the 4 outer empty, subequal, awned; the 3 inner small in the flowering stage, but enlarged in fruit, concave, coriaceous, obtuse. Stamens 4–6 in each flower, elongated in fruit. Style-branches 2–4. Nut small, $\frac{1}{6}$–$\frac{1}{5}$ in. long, elliptic-obovoid, black when fully ripe, transversely grooved within.—*Cheesem. Man. N.Z. Fl.* (1906) 794.

North Island: Wellington—Mungaroa, *T. Kirk!* March.

My knowledge of this plant is confined to the specimens in Mr. Kirk's herbarium. These greatly resemble *G. rigida*, but the plant is said to be much larger, and the nut to be always black when fully ripe.

6. **G. procera** *Forst. Char. Gen.* (1776) 52.—Stems stout, densely tufted, 2–4 ft. high. Leaves equalling or exceeding the stems, narrowed into long filiform points; margins involute, smooth below, scabrid above; sheaths dark-brown or almost black. Panicle slender, lax but narrow, elongate, 12–18 in. long; branches often remote, short, erect or slightly drooping in fruit; bracts leafy, with purplish-black sheaths. Spikelets scattered along the branches or clustered towards their tips, large, $\frac{1}{3}$–$\frac{1}{2}$ in. long, dark purplish-black, 2-flowered; lower flower male, upper hermaphrodite and fruit-bearing. Glumes 4; 2 outer empty, very large and exceeding the spikelet, elliptic-lanceolate, mucronate, striate; 2 inner shorter, oblong-lanceolate, obtuse. Stamens usually 4 to each flower; filaments elongating greatly in fruit. Style-branches 4. Nut large, $\frac{1}{4}$ in. long, narrow-elliptic, smooth and shining, obscurely grooved, reddish-brown or reddish-yellow when ripe, transversely grooved within.—*A. Rich. Fl.*

Nouv. Zel. (1832) 112; *A. Cunn. Precur.* (1836) n. 284; *Raoul Choix* (1846) 40; *Hook. f. Fl. Nov. Zel.* i (1853) 278; *Handb. N.Z. Fl.* (1864) 306; *Cheesem. Man. N.Z. Fl.* (1906) 306; *Ill. N.Z. Fl.* ii (1914) t. 212.

South Island: Probably abundant on the western side of the Island. Nelson—Buller Valley, *T. F. C.*; Mount Rochfort and vicinity of Westport, *W. Townson!* Westland—Hokitika, *T. Kirk!* Kelly's Hill, *Cockayne!* Otago—Dusky Sound, *Forster*; Port Preservation, *Lyall*; Clinton Valley, *Petrie.* Stewart Island: Port Pegasus, *Petrie! Pearson!* Sea-level to 2500 ft. December–February.

A very distinct species, remarkable for the large purplish-black spikelets and long empty glumes, which are only two in number. There is an unnamed specimen, presumably from the North Island, in Mr. Colenso's herbarium.

7. **G. lacera** *Steud. Cyp.* (1855) 164.—Stems rather slender, leafy, densely tufted, 2–4 ft. high. Leaves equalling or exceeding the stems, flat or involute, $\frac{1}{3}$–$\frac{1}{2}$ in. broad, narrowed into long filiform points, margins scabrid. Panicle elongated, narrow but rather dense, 9–18 in. long; branches short, erect or inclined; bracts long and leafy. Spikelets alternate on the branches of the panicle, shortly pedicelled, brown, 1-flowered. Glumes 4–5; 2 or 3 outer empty, subequal, ovate or ovate-lanceolate, acuminate or awned, rather membranous, minutely scaberulous on the back; 2 inner shorter, concave, obtuse, margins scarious and lacerate. Stamens 4; filaments greatly elongate in fruit. Style-branches 3. Nut small, $\frac{1}{6}$ in. long, oblong-obovoid, obtuse, shining, black, very obscurely transversely striate within.—*Hook. f. Handb. N.Z. Fl.* (1864) 306; *Cheesem. Man. N.Z. Fl.* (1906) 795. Lampocarya lacera *A. Rich. Fl. Nouv. Zel.* (1832) 109; *A. Cunn. Precur.* (1836) n. 281; *Raoul Choix* (1846) 40; *Hook. f. Fl. Nov. Zel.* i (1853) 277.

North Island: From the North Cape to Cook Strait, not uncommon. Sea-level to 2000 ft. July–August.

This is quoted from the South Island in the Handbook, but I have seen no specimens from thence.

8. **G. gahniaeformis** *A. A. Heller in Minnes. Bot. Stud.* i, 802.—Stems short, densely tufted, obtusely trigonous, leafy, 6–18 in. high. Leaves very numerous, spreading, much exceeding the stems, narrow, rigid, scabrid, sheaths short, submembranous. Panicle narrow, contracted, rigid, leafy, 3–9 in. long; branches few, short, erect; bracts very long and leafy. Spikelets clustered on the branches, elliptic-lanceolate, turgid, acute, chestnut-brown, 1-flowered. Glumes 6, firm and coriaceous, minutely puberulous, ciliolate on the margins; 4 outer small, gradually increasing in size, ovate-lanceolate, acuminate, awned; 2 inner much longer, rigid in fruit, acuminate. Stamens usually 3; filaments scarcely lengthening after flowering. Style-branches 3. Nut small, ovoid, obscurely trigonous, minutely apiculate, smooth, black, not transversely grooved within.—G. Gaudichaudii *Steud. Cyp.* (1855) 164; *Hillebr. Fl. Hawaii* (1888) 481; *Cheesem. Man. N.Z. Fl.* (1906) 795; *C. B. Clarke Ill. Cyp.* (1909) t. xciii, f. 5–6. G. affinis *Steud. Cyp.* (1855) 164. G. arenaria *Hook. f. Handb. N.Z. Fl.* (1864) 306. Lampocarya affinis *Brong. in Duperr. Voy. Coq. Bot.* (1829) 166, t. 29; *Hook. f. Fl. Nov. Zel.* i (1853) 277. Morelotia gahniaeformis *Gaud. in Freyc. Voy. Bot.* (1826) 416, t. 28; *A. Rich. Fl. Nouv. Zel.* (1832) 115; *A. Cunn. Precur.* (1836) n. 285; *Raoul Choix* (1846) 40.

North and South Islands: Dry hills from the North Cape to Banks Peninsula, but not common to the south of Cook Strait. Sea-level to 2000 ft.

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South Island : Probably abundant on the western side of the Island. Nelson—Buller Valley, *T. F. C.* ; Mount Rochfort and vicinity of Westport, *W. Townson!* West- *T. Kirk!* Kelly's Hill, *Cockayne!* Otago—Dusky Sound, *Forster* ; Port [illegible] Port Pegasus, *Petrie!*

H. Pfeiffer, Oreobolus R.Br, eine merkwürdi Cyperaceengattung. Fedde, Repertorium spec. nov. XXIII,1927, p. 339.

p. 351. A. Scapo axillaribus. a. Nuce obo[illegible]a vel oblonga subtrigona,2-3 mm alta.
§.Foliis su[illegible]istichis: O.Pumilio R.Br.
§§. " inc[illegible]te imbricatis: O. obtusangulus Gaud.
b. Nuce exact globulata, 1-1.5 mm diam.:O.Pfeifferianus Barros

B. Scapo plerumque furcato,nuce 2-3 m longa: O. furcatus Mann.

O. Pumilio R.Br. Syn. O distichus F.v.M.; O. pectinatus Hook fil.- Victoria, Tasmania.

Var. strictus (Berggr.) H. Pfeiffer.Syn.O. strictus Berggr., O. serrulatus Col. Neu-Seeland, Mt Tongariro, H. Hill.

(Pfeiffer calls O. pumilio "planta maxime variabilis"; the difference between it and var. strictus are, acc. to him: strictus nuce oblonga apice acutata, alba, granulis poriferis dense obtecta; pumilio nuce obovata obtusa subtrigona nitida. - C.S. has a strong feeling that P:s work is humbug.)

p. 352. O. Pfeifferianus Barros.-Herbula muscoidea caespitosa glabra; caulibus erectis 4-10 cm altis subfastigiatis superne ramosis dense foliosis, ramis sparsis apice 1-floris; foliis 3-8 cm longis erectis undique arcte imbricatis lineari-subulatis obtusis tere-tiusculis compressis fistulosis basi vaginantibus, dorso versus medium vaginibusque vaginarum parce ciliatis; pedunculis brevissimis flores ♀ 1 (staminaque 3)gerentibus; nuce exacte globulata quam in O. Pumilio brevior, styli basi permanente rostellulata. Australien. N.S.Wales (Wilcox!).

What you, Lucy May Cranwell, should do get togethe living, flowering and fruiting material of all N.Z. Oreobolus, monograph them proprly morphologically and anatomic-ally, for this has never been made: and the confusim will disappear. There may be hybrids when they grow mixed, as they certainly do.- I do not know who Barros is; Ind. Kew. quotes "Barros in Fedde, Repert."

Cheesem. Man. [illegible] *C. B. Clarke Ill. Cyp.* (1909) t. xciii, f. 5–6. G. affinis *Steud. Cyp.* (1855) 164. G. arenaria *Hook. f. Handb. N.Z. Fl.* (1864) 306. Lampocarya affinis *Brong. in Duperr. Voy. Coq. Bot.* (1829) 166, t. 29 ; *Hook. f. Fl. Nov. Zel.* i (1853) 277. Morelotia gahniaeformis *Gaud. in Freyc. Voy. Bot.* (1826) 416, t. 28 ; *A. Rich. Fl. Nouv. Zel.* (1832) 115 ; *A. Cunn. Precur.* (1836) n. 285 ; *Raoul Choix* (1846) 40.

North and South Islands : Dry hills from the North Cape to Banks Peninsula, but not common to the south of Cook Strait. Sea-level to 2000 ft.

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Blake Queensland? 1943.

D. arenaria Sol. m.s. 65.

12. OREOBOLUS R. Br. 1810

Dwarf perennial herbs, forming dense cushion-shaped masses in alpine bogs. Stems branched, very closely compacted, leafy throughout. Leaves numerous, close-set, distichous and equitant, more rarely irregularly imbricate all round. Peduncle axillary, short at first but lengthening after the flowers expand, strict, compressed, bearing a terminal spikelet with or without 1 or 2 lateral ones. Spikelets minute, narrow, 1-flowered; flower hermaphrodite. Glumes 3 or rarely 4, the outer the largest, the second and third subequal, the fourth when present small, not much longer than the nut. Hypogynous scales (perianth-segments) 6, in 2 series, subequal, narrow, rigid, erect. Stamens 3. Style slender, continuous with the ovary; branches 3. Nut obovoid, obtuse with a depressed star-like mark at the apex, smooth.

In addition to the 3 species described below, one of which extends to Victoria and Tasmania, there is also one in Andine and antarctic America, and another in the Sandwich Islands.

Leaves obscurely distichous, very narrow, strict. Peduncle shorter than the leaves; spikelets usually 1 .. .. 1. *O. strictus.*
Leaves obscurely distichous. Peduncle shorter than the leaves; spikelets usually 2, rarely 1 or 3 .. .. 2. *O. pumilio.*
Leaves conspicuously distichous. Peduncles often equalling or exceeding the leaves in fruit; spikelets usually 1 .. .. .. 3. *O. pectinatus.*

1. **O. strictus** *Berggr. in Minneskr. Fisiog. Sallsk. Lund.* (1877) 25, t. 6, f. 12–24.—Stems 2–3 in. high, creeping and rooting at the base, laxly tufted, much branched; branches not nearly so dense as in *O. pumilio*, erect, curved, leafy throughout their length. Leaves obscurely distichous, 1–2½ in. long, strict and erect or secund, very narrow-linear, deeply canaliculate above, obtuse, margins minutely serrulate; sheaths broad, membranous, 3–5-nerved, rounded or truncate at the tip. Peduncle much shorter than the leaves; spikelets 1, rarely 2, narrow. Glumes 3; outer the largest, minutely serrulate; the two others subequal, narrow, erect. Hypogynous scales 6, narrow-lanceolate, acute, minutely serrulate. Stamens 3. Style-branches 3, long, filiform. Nut small, obovoid, narrowed at the base, obtuse, white.—*Cheesem. Man. N.Z. Fl.* (1906) 797. O. serrulatus *Col. in Trans. N.Z. Inst.* xxii (1890) 492.

North Island: Rangipo Plain, Ruapehu, *H. Hill;* Ruahine Mountains, *B. C. Aston!* South Island: Nelson—Mount Arthur Plateau, *T. F. C.;* Lake Rotoiti, *T. Kirk!* Canterbury—Arthur's Pass, *Berggren! T. Kirk! T. F. C.;* Lake Tennyson, *R. M. Laing.* Westland—Mount Greenland, *Cockayne.* Otago—Not uncommon on the mountains of the interior, *T. Kirk! Petrie!* and others. Stewart Island: Fairly plentiful, *T. Kirk! Cockayne.* Usually between 3000 and 5000 ft., but descends to sea-level in Stewart Island and the south of Otago.

Very close to *O. pumilio*, but a much more laxly tufted plant, with narrower strict leaves, which considerably overtop the peduncle.

2. **O. pumilio** *R. Br. Prodr.* (1810) 236. — Stems much branched, short, ½–2 in. high, forming broad and dense cushion-shaped masses. Leaves obscurely distichous, ½–1½ in. long, erect or incurved, rarely spreading, narrow-linear, narrowed towards the obtuse tip, concave or almost flat in front, veinless or indistinctly 3-nerved; margins minutely serrulate; sheaths equitant, membranous, 3-nerved. Peduncles stout, rigid, mostly shorter than the leaves; spikelets usually 2, rarely 3 or 1. Glumes 3–4; the outer one the largest, leaf-like, 3-nerved; the second and third about

equal; the fourth, when present, minute, not much exceeding the nut. Hypogynous scales narrow-lanceolate, acute, serrulate. Stamens 3. Style-branches 3. Nut small, obovoid, obtuse, whitish or brownish.—*Hook. f. Handbk. N.Z. Fl.* (1864) 308; *Fl. Tasm.* ii (1860) 94; *Benth. Fl. Austral.* vii (1878) 346; *Cheesem. Man. N.Z. Fl.* (1906) 796; *C. B. Clarke Ill. Cyp.* (1909) t. cii, f. 1–5.

South Island: Nelson—Mount Rochfort and other mountains near Westport, *W. Townson!* Westland—Arthur's Pass, *T. F. C.;* Kelly's Hill, *Petrie!* Worsley's Pass, *Cockayne!* Otago—Mountains above Lake Harris, *T. Kirk!* 2000–5000 ft.

3. **O. pectinatus** *Hook. f. Fl. Antarct.* i (1844) 87, t. 49.—Larger and softer than the two preceding species, sometimes forming masses 2–3 in. deep and a foot or more in diameter. Leaves conspicuously distichous, and often almost flabellately arranged, densely imbricating, equitant and sheathing at the base; blade $\frac{1}{2}$–$\frac{3}{4}$ in. long, linear-subulate, obtuse, rigid, channelled in front; sheathing base longer and broader, 5–7-nerved. Peduncles terminal, short in the flowering stage, but elongating in fruit, and then often equalling or even exceeding the leaves. Spikelets usually solitary. Flowers and fruit very similar to those of *O. pumilio.*—*Hook. f. Fl. Nov. Zel.* i (1853) 275. O. pumilio *var.* pectinatus *C. B. Clarke in Cheesem. Man. N.Z. Fl.* (1906) 797.

North Island: From the summit of Moehau (Cape Colville) to Mount Hikurangi (East Cape), Tongariro, and Ruapehu, and the Ruahine, Kaimanawa, and Tararua Mountains. South Island, Stewart Island: Abundant throughout in mountain districts. Auckland and Campbell Islands: Plentiful in open situations. Altitudinal range from 1500 to 4500 ft., but descends to sea-level in Stewart Island and the Auckland Islands.

The strongly distichous leaves and larger size give this plant a different appearance from any state of *O. pumilio* I have seen. I have therefore restored it to the rank of a species.

13. **UNCINIA** Pers. 1807

Perennial herbs, usually tufted and grass-like, with fibrous roots. Culms erect, terete or obscurely trigonous, striate, leafy at the base. Leaves very narrow-linear, flat or involute, often keeled, margins usually scabrid. Spikelets unisexual, arranged in a simple linear or oblong spike; male terminal; females placed lower down. Glumes imbricated all round the axis, ovate or oblong or lanceolate, obtuse or acute or the lower ones awned, concave, 1–3-nerved. Male flowers with 3 stamens; filaments filiform in all the New Zealand species, flat and dilated in some others. Female flowers with the ovary included in a flask-shaped organ called the utricle or perigynium; style long, protruding; branches 3, filiform. Rhachilla produced beyond the mouth of the utricle into a long bristle hooked at the tip. Nut trigonous or subcompressed, enclosed in the persistent more or less enlarged utricle.

A genus of about 30 species, found in New Zealand, Australia, Tasmania, New Guinea, Kerguelen and Amsterdam Islands, and America from Fuegia northwards to the West Indies, Mexico, and the Sandwich Islands. Of the 14 species found in New Zealand, 4 extend to Australia and Tasmania, of which one stretches as far as New Guinea, and another to Kerguelen; while one each is found in temperate South America and in the Sandwich Islands. The remaining 8 are endemic. The genus only differs from *Carex* in the rhachilla being exserted beyond the utricle in the shape of a hooked bristle. The New Zealand species are highly variable and most difficult of discrimination. *U. purpurata, U. caespitosa, U. riparia, U. rupestris,* and *U. filiformis* present an almost unbroken series of forms, and I doubt if any two observers would arrive at the same conclusions respecting them, even if they worked on the same material.

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Key to UNCINIA, adapted from Kukenthal.

1. Spikes dense; glumes persistent, not articulate 2
   Spikes often lax; glumes deciduous, articulate 7
2. Utricle hispid above and on margins . . . . . macrolepis
   Utricle glabrous 3
3. Rhizome shortly stolon. ♂ spike gradually contracted; utricles sub-obovate oblong . . . . . fusco-vaginata
   Rhizome caespitae; ♂ spike long, abruptly contracted 4
4. Spikes not 7⅛ cm., Utricle shortly stipulate 5
   Spikes 10-15 cm., utricle long-stipulate. 6
5. Spikes cylind., 2-4 cm.; gl. ovate-obtuse, purple-chestnut, wide white margins, utricles about 2x glumes . . . . . purpurata
   Spikes linear-cylind., 6-8 cm.; gl. oblong-lanceolate, acute, straw-colrd., narrow white margins, utricles hardly exceeding glumes . . . . . caespitosa
6. Leaves red, spikes linear-cylind. 3 mm. glume rather obtuse, utricles exceed. glumes, obsoletely nerved . . . . . pedicellata
   Leaves green, spikes cylind., 5 mm. glumes acute; utricles = glumes; 2 shin prominent lateral nerves . . . . . uncinata
7. Rhizome caespitose, but little elongate . 8
   Rhizome long, stoloniferous 11
8. Spike narrow-oblong, ½-2 cm., somewhat dense, utricles lanceolate-elliptic, 2 raised latera nerves . . . . . rupestris
   Spike elongate, rather lax-fld, utricles narrow-oblong, many nerved 9
9. Utricle saabrid above . . . . leptostachya
   Utricle glabrous 10
10. Culm slender triquet, Lvs. much exceed. culm . . . . . riparia
    Culms rigid terete, lvs. red, much shorter than culm . . . . . rubra

11. Rhizome hard, spikes dense-fld. utric. elliptic. . . . . compacta
    Rhizome thin, spikes lax 12
12. Utricles lanceol.-elliptic, 5½ mm., suberect . . . . . tenella
    Utricles lanceol.-subulate, 7 mm., finely obliquely patent . . . . . filiformis

Section A. Spike short, rather broad, ⅓–1 in. long, oblong or linear-oblong, more or less dense-flowered.

Culms 2–9 in., rather stout. Leaves shorter than the culms, $\frac{1}{12}$–$\frac{1}{10}$ in. diam. Spike pale, ½–1 in. Utricle scabrid .. 1. *U. macrolepis.*

Culms 2–6 in., weak. Leaves longer than the culms, filiform, $\frac{1}{30}$–$\frac{1}{20}$ in. diam. Spike pale, ⅓–½ in. Utricle lanceolate .. 2. *U. tenella.*

Culms 4–9 in., slender, strict. Leaves shorter than the culms, filiform, $\frac{1}{40}$–$\frac{1}{30}$ in. diam. Spike brownish, ⅓–⅔ in. Utricles conspicuously nerved .. .. 3. *U. nervosa.*

Culms 3–12 in., stout. Leaves flat, grassy, $\frac{1}{12}$–⅛ in. diam. Spike brown or chestnut-brown, ½–1 in. long. Utricles faintly nerved 4. *U. compacta.*

Section B. Spike elongated, 1–6 in. long, linear or narrow linear-oblong, more or less dense-flowered, continuous.

Culms 4–12 in., stout, rigid, furnished at the base with brownish scales. Leaves exceeding the culms, $\frac{1}{12}$–⅛ in. diam. .. 5. *U. fusco-vaginata.*

Culms 6–14 in., stout or slender. Leaves shorter than the stems. Spike brownish, 1–2 in. Glumes oblong-obovate, usually obtuse 6. *U. purpurata.*

Culms 6–14 in., slender. Leaves flat, grassy, $\frac{1}{15}$–⅙ in. broad. Spike pale or green, 1½–3 in. Glumes oblong-lanceolate, acute or acuminate .. .. 7. *U. caespitosa.*

Culms 9–20 in., slender. Leaves flat, grassy, ⅛–¼ in. broad. Spike 3–6 in., linear-elongate. Glumes oblong-lanceolate, brownish .. .. 8. *U. australis.*

Section C. Spike ½–4 in. long, linear, very slender, lax-flowered, usually interrupted towards the base.

Culms 12–24 in., slender. Leaves flat, $\frac{1}{12}$–$\frac{1}{10}$ in. diam. Spike 1½–5 in. Utricles scabrid above .. .. 9. *U. leptostachya.*

Culms 9–20 in., slender. Leaves usually flat, $\frac{1}{30}$–$\frac{1}{10}$ in. diam. Spike 1¼–4 in., green. Glumes shorter than the utricles, in var. *Banksii* barely ½ the length .. .. 10. *U. riparia.*

Red-brown. Culms 6–14 in., rigid. Leaves usually shorter than the culms, $\frac{1}{12}$–$\frac{1}{10}$ in. Spike 1–2 in., rigid. Glumes nearly as long as the utricles .. .. 11. *U. rubra.*

Usually red-brown. Culms 12–24 in., strict and rigid. Spike 1½–3 in. Glumes oblong-lanceolate, not so long as the utricle 12. *U. strictissima.*

Culms 3–12 in., slender. Leaves usually shorter than the culms, flat, $\frac{1}{25}$–$\frac{1}{15}$ in. diam. Glumes brown or chestnut, almost as long as the utricle .. .. 13. *U. rupestris.*

Culms 3–9 in., very slender. Leaves usually longer than the culms, filiform, $\frac{1}{50}$–$\frac{1}{30}$ in. diam. Spike ½–1½ in., extremely slender. Glumes pale, equalling the utricles .. .. 14. *U. filiformis.*

1. **U. macrolepis** *Decne. in Durv. Voy. Pôle Sud. Bot.* ii (1853) 13, t. 6, fig. A.—Rhizome stoloniferous. Culms 2–9 in. high, rather stout, smooth, subrigid, erect or curved, obtusely trigonous, leafy towards the base. Leaves shorter than the culms or equalling them, flat, grassy, $\frac{1}{12}$–$\frac{1}{10}$ in. broad; margins scabrid. Spike rather stout, dense, narrow-oblong, ½–1 in. long; male portion very short, narrow; bract wanting. Glumes ovate, obtuse or the lowest subacute, pale whitish-green with broad scarious margins, many-nerved on the back. Utricles equalling the glumes or rather longer than them, ovate-lanceolate, narrowed at both ends, triquetrous, nerved, scabrid towards the tip, margins ciliate; bristle yellowish, twice the length of the utricle. Nut elliptic-oblong, trigonous.—*Desv. in Gay Hist. Chile*, vi (1853) 230. U. Sinclairii *Boott in Hook. f. Handb. N.Z. Fl.* (1864) 309; *C. B. Clarke in Journ. Linn. Soc.* xx (1883) 394; *Kukenth. in Bot. Central.* lxxxii (1900) 99; *Cheesem. Man. N.Z. Fl.* (1906) 799.

Var. **elegans** *Kukenth. in Cheesem. Man. N.Z. Fl.* (1906) 799.—Culms more slender. Leaves numerous, $\frac{1}{20}$–$\frac{1}{15}$ in. broad, exceeding the culms. Spike elongate, $\frac{3}{4}$–$1\frac{1}{4}$ in. long, linear. Glumes cinnamon-brown.

South Island: Nelson—Lake Tennyson, *H. H. Travers.* Canterbury—Broken River, *J. D. Enys!* Otago—Eweburn, Naseby, Hector Mountains, Mount Cardrona, Upper Hawea, *Petrie! Crosby Smith!* Dart Valley, *T. Kirk!* Var. *elegans:* Black's, Otago, *Petrie!* 1200–4000 ft. December–February.

This plant, New Zealand specimens of which were described as a distinct species by Hooker under the name of *U. Sinclairii*, has proved upon investigation by Kukenthal to be identical with the *U. macrolepis* of southern Chile and Fuegia. In New Zealand it ranges from the south of Nelson to Southland, but is nowhere abundant.

2. **U. tenella** *R. Br. Prodr.* (1810) 241.—Rhizome long, slender, emitting creeping stolons. Culms densely tufted, setaceous, smooth and flaccid, 2–6 in. long. Leaves numerous, usually overtopping the culms, flat, grassy, filiform, $\frac{1}{30}$–$\frac{1}{20}$ in. broad. Spike oblong, short, dense, $\frac{1}{3}$–$\frac{2}{3}$ in. long, $\frac{1}{6}$ in. broad; male portion very short, inconspicuous, sometimes reduced to 1 or 2 flowers; female flowers 6–10; lowest glume produced into a setaceous bract usually far exceeding the spike. Glumes lanceolate, acute, pale-fulvous, 1-nerved; margins pale, thin and membranous. Stamens 2 or 3. Utricles slightly longer than the glumes, oblong-lanceolate, obsoletely trigonous, narrowed at both ends, glabrous, faintly nerved; bristle nearly twice the length of the utricle.—*Hook f. Fl. Tasm.* ii (1860) 102, t. 152. *Benth. Fl. Austral.* vii (1878) 433; *C. B. Clarke in Journ. Linn. Soc.* xx (1883) 391; *Kukenth. in Pflanzenr.* Heft 38, 66; *Cheesem. Man. N.Z. Fl.* (1906) 799.

Var. **longifructus** *Kukenth. in Pflanzenr. l.c.*—Utricles $\frac{1}{3}$ in. long, yellowish-green, far exceeding the glumes, which are usually 3-nerved on the back.

South Island: Westland—Kelly's Hill, altitude 4500 ft., *Petrie!* Otago—Routeburn, near Lake Wakatipu, in beech forest, *T. Kirk! Petrie!* Clinton Valley, *Petrie!* End Peak, *Crosby Smith!* 2000–5000 ft.

Mr. Petrie's specimens from Kelly's Hill cannot be distinguished from the Australian plant, but var. *longifructus* is at once separated by the large fruit, which is nearly twice the size of that of the type. It appears to be confined to New Zealand.

3. **U. nervosa** *Boott ex Hook. f. Fl. Tasm.* ii, 102, t. 153A.—Culms densely tufted, slender, strict and wiry, 4–9 in. high, leafy at the base only. Leaves shorter than the culms, strict, erect, wiry, filiform, $\frac{1}{40}$–$\frac{1}{30}$ in. diam.; margins involute. Spike much more slender than in *U. compacta*, and not so dense, $\frac{1}{3}$–$\frac{2}{3}$ in. long, about $\frac{1}{6}$ in. diam.; lowest glume sometimes produced into a filiform bract. Glumes ovate-lanceolate, subacute, pale-brown, keel distinctly 3-nerved or -plicate; margins thin and membranous, almost scarious. Utricles equalling or slightly exceeding the glumes, oblong-lanceolate, narrowed at both ends, trigonous, glabrous, distinctly nerved; bristle about twice the length of the utricle. Nut trigonous.—*Cheesem. Man. N.Z. Fl.* (1906) 800. U. compacta *var.* nervosa *C. B. Clarke in Journ. Linn. Soc.* xx (1884) 395. U. Cheesemaniana *Boeck. in Engl. Bot. Jahr.* v (1884) 521.

South Island: Nelson—Mount Arthur Plateau, *T. F. C.* Otago—Maungatua, *Petrie!* 2000–5000 ft.

Dr. Kukenthal considers that the Tasmanian species described by Boott under the name of *U. nervosa*, together with the plant from the Mount Arthur Plateau associated with it by myself, are both referable to Raoul's *U. rupestris*, originally discovered at Akaroa. I regret that I am unable to agree with this opinion, which is not shared by any other worker in the genus. I take it that *U. nervosa* naturally falls into the

neighbourhood of *U. compacta*, whereas the true *U. rupestris* of Raoul, judging from his plate and description, is closely allied to *U. riparia*. This view was also held by Mr. C. B. Clarke, with whom I had some correspondence on the subject.

4. **U. compacta** *R. Br. Prodr.* (1810) 241.—Rhizome creeping, stoloniferous. Culms rather stout, rigid, obscurely trigonous, leafy towards the base, variable in size, in dry open or alpine situations often dwarfed to 2 in. or even less, in moist sheltered or shaded localities attaining 8–10 in. Leaves usually shorter than the stems but sometimes equalling or even exceeding them, subrigid, flat, grassy, striate, $\frac{1}{12}$–$\frac{1}{8}$ in. broad; margins scabrid. Spike short, stout, dense, oblong, $\frac{1}{2}$–1 in. long by about $\frac{1}{4}$ in. diam., pale greenish-brown to chestnut-brown; the lowest glume sometimes produced into a leaf-like bract occasionally exceeding the spike. Glumes ovate-lanceolate, acute or subacute; keel greenish, 1–3-nerved; margins pale-brown, membranous. Stamens 3. Utricles about equalling the glumes, oblong-lanceolate, narrowed at both ends, trigonous, glabrous, smooth or faintly nerved, spreading when fully ripe; bristle stout, about twice the length of the utricle. Nut trigonous.—*Hook. f. Handb. N.Z. Fl.* (1864) 309; *Fl. Tasm.* ii (1860) 102, t. 153B; *Benth. Fl. Austral.* vii (1878) 434; *C. B. Clarke in Journ. Linn. Soc.* xx (1883) 394; *Kukenth. in Pflanzenr.* Heft 38 (1909) 65; *Cheesem. Man. N.Z. Fl.* (1906) 800. U. divaricata *Boott in Hook. f. Fl. Nov. Zel.* i (1853) 286. U. Clarkei *Petrie in Trans. N.Z. Inst.* xx (1887) 185.

Var. **Clarkei** *Kukenth. in Pflanzenr.* Heft 38 (1909) 185.—Culms taller, often reaching 12 in. Spike longer and not so dense, 1–2 in. long; bract usually overtopping the spike. Glumes paler. Utricles smaller and narrower, and more evidently stipitate.—U. compacta *var.* Petriei *C. B. Clarke in Cheesem. Man. N.Z. Fl.* (1906) 800.

Var. **caespitiformis** *Kukenth. in Cockayne Surv. Stewart Is.* (1909) 42.— Rhizome densely tufted, putting out short stolons. Culms and leaves rigid. Spikes narrow. Utricles spreading when mature.

North Island: In mountain districts from Mount Egmont, Ruapehu, and Hikurangi to Mount Hector, not uncommon. South Island, Stewart Island: Abundant in subalpine districts throughout. 1000–5500 ft. December–March. Var. *Clarkei*: Apparently as widely distributed as the species. Var. *caespitiformis*: Mount Anglem, Stewart Island, *Cockayne*.

Kukenthal keeps up Hooker's var. *divaricata* for the reception of most of the New Zealand forms, but the differences are really very trivial, consisting of little more than the taller culms and stouter spikelets.

The geographical range of the species is peculiar. In addition to New Zealand, it is found in Victoria and Tasmania, in Kerguelen, and in Amsterdam Island.

5. **U. fusco-vaginata** *Kukenth. in Bull. Herb. Boiss.* Series 2, vol. iv (1904) 50.—Rhizome thick, woody, shortly stoloniferous. Culms tufted, 4–12 in. long, rarely more, rigid, angled, scabrid above, furnished at the base with brown leafless scales. Leaves exceeding the culms, $\frac{1}{12}$–$\frac{1}{8}$ in. broad, rigid, flat, striate, scabrous, gradually tapering to an acuminate point. Spike linear-oblong, somewhat subclavate, dense-flowered, $1\frac{1}{4}$–$2\frac{1}{2}$ in. long; male portion short, cylindric; bract often absent, but sometimes present and exceeding the spike. Female glumes oblong-lanceolate, subobtuse, pale-ferruginous, green on the back and 3-nerved. Utricle slightly exceeding the glumes, obovate-oblong, about $\frac{1}{4}$ in. long, narrowed at each end, somewhat spongy at the base, finely striate; bristle twice the length of the utricle.—*Kukenth. in Pflanzenr.* Heft 38 (1909) 60. U. compacta *var.* viridis *C. B. Clarke in Journ. Linn. Soc.* xx (1883) 395. U. purpurata *var.* fusco-vaginata *Cheesem. Man. N.Z. Fl.* (1906) 801.

North Island: Ruahine Mountains, *Colenso!* Mount Holdsworth, *W. Townson! Petrie!* Mount Hector, *Petrie! B. C. Aston!* South Island: Mount Duppa (Marlborough), *J. H. Macmahon!* Nelson—Mount Arthur Plateau, *T. F. C.;* Boundary Peak, *W. Townson!* Clarence Valley, *T. F. C.* Canterbury—Craigieburn Mountains, *Cockayne!* Broken River, *T. F. C.* 2000–4500 ft.

About midway between *U. compacta* and *U. purpurata*, and very close to some forms of the latter; but always to be distinguished by the stouter and more rigid habit, and longer and broader leaves.

6. **U. purpurata** *Petrie in Trans. N.Z. Inst.* xvii (1885) 272.—Culms tufted, slender or rather stout, scabrid above, leafy at the base, 6–14 in. high. Leaves usually shorter than the stems but sometimes equalling them, flat or slightly concave, grassy, striate, $\frac{1}{20}$–$\frac{1}{12}$ in. broad; margins scabrid; sheaths at the base dusky-brown. Spike $\frac{3}{4}$–2 in. long, linear-oblong, usually dense, continuous. Male portion short, cylindric; bract absent, or present and exceeding the spike. Glumes oblong or obovate, obtuse or subacute, dark-brown with pale scarious margins, shorter than the utricle. Utricle lanceolate, tapering at both ends, plano-convex, quite glabrous, faintly nerved, about $\frac{1}{4}$ in. long; bristle nearly twice as long as the utricle.—*Cheesem. Man. N.Z. Fl.* (1906) 801; *Kukenth. in Pflanzenr.* Heft 38 (1909). Trans. 42 : 209 var. subcaespitosa Kük

Var. **robusta** *Petrie in Trans. N.Z. Inst.* xvii (1885) 272.—Culms shorter and stouter, scabrid above. Leaves as long as the culms, $\frac{1}{10}$ in broad.

South Island: Otago—Not uncommon in mountain districts. 500–2000 ft.

This approaches very near to some states of *U. caespitosa*, to which I am inclined to refer Kukenthal's var. *subcaespitosa* (*Pflanzenr.* Heft 38 (1909) 61).

7. **U. caespitosa** *Boott in Hook. f. Fl. Nov. Zel.* i (1853) 287.—Culms tufted, slender, leafy, 6–14 in. high. Leaves longer or shorter than the culms, flat, grassy, very variable in width, from $\frac{1}{15}$–$\frac{1}{6}$ in. broad; margins scabrid. Spike $1\frac{1}{2}$–3 in. long, narrow-oblong or almost linear, rather dense or lax but not interrupted; male portion very short; bract variable, broad and foliaceous or narrow and setaceous. Glumes lanceolate or oblong-lanceolate, acute or acuminate, membranous, green or pale-green, usually equalling the utricle. Utricles about $\frac{1}{4}$ in. long, oblong-lanceolate, suddenly narrowed above, smooth or faintly nerved; bristle about twice the length of the utricle.—*Hook. f. Handb. N.Z. Fl.* (1864) 310; *C. B. Clarke in Journ. Linn. Soc.* xx (1883) 393; *Cheesem. Man. N.Z. Fl.* (1906) 801; *Ill. N.Z. Fl.* ii (1914) t. 213; *Kukenth. in Pflanzenr.* Heft 38 (1909) 61. U. horizontalis *Col. in Trans. N.Z. Inst.* xv (1883) 334.

Var. **collina** *Petrie in Trans. N.Z. Inst.* lii (1920) 19.—Forming sward-like patches. Culms and leaves shorter than in the type, the latter flat, grassy, thickened at the tips. Spikes dense-flowered, often subclavate.

Var. **minor** *Kukenth. in Cheesem. Man. N.Z. Fl.* (1906) 802.—Smaller and more slender. Leaves narrower. Spike shorter, much more slender.—*Pflanzenr.* Heft 38 (1909) 61.

North and South Islands, Stewart Island: In hilly or mountainous localities from Hokianga southwards, not uncommon. Sea-level to 4000 ft. November–January. Var. *collina:* Mount Hikurangi, *Petrie* and *Adams!* Ruahine Mountains, *B. C. Aston!* Tararua Mountains, *Petrie!*

An exceedingly variable plant, forms of which are not separated by any strict line of demarcation from *U. purpurata, U. riparia, U. rupestris,* and *U. filiformis.* Its chief characters are the rather broad flat leaves, not very lax narrow-oblong spike, pale-green glumes which are usually as long as the utricles or nearly so, and rather large oblong-lanceolate acuminate utricles, averaging $\frac{1}{4}$ in. long.

8. **U. australis** *Pers. Syn.* ii (1807) 534.—Culms densely tufted, tall, slender, smooth, 9–20 in. high, leafy at the base. Leaves long, usually considerably overtopping the culms, flat, striate, $\frac{1}{8}$–$\frac{1}{4}$ in. broad; margins scabrid. Spike linear-elongate, 3–6 in. long, $\frac{1}{6}$–$\frac{1}{4}$ in. broad, dense except sometimes at the base, cylindrical; male portion narrower, variable in length, occupying $\frac{1}{3}$–$\frac{1}{6}$ of the spike; bract long, leafy, usually exceeding the spike. Glumes oblong-lanceolate, acute, 1-nerved, at first pale-green, but brown or chestnut in fruit, upper about equalling the utricle, lower sometimes exceeding it. Stamens 3. Utricle elliptic-oblong, narrowed at both ends, sometimes almost fusiform, triquetrous, faintly nerved; bristle stout, nearly twice the length of the utricle.—*A. Cunn. Precur.* (1836) n. 286; *Raoul Choix* (1846) 40; *Hook. f. Fl. Nov. Zel.* i (1853) 287; *Handb. N.Z. Fl.* (1864) 309; *C. B. Clarke in Journ. Linn. Soc.* xx (1883) 393; *Cheesem. Man. N.Z. Fl.* (1906) 802. U. compacta *A. Rich. Fl. Nouv. Zel.* (1832) 118 (*not of R. Br.*). U. Lindleyana *Kunth. Enum.* ii (1837) 526. U. scaberrima *Nees in Linnaea*, ix (1834) 305. U. rigidula *Steud. Cyp.* (1855) 245. U. alopecurioides *Col. in Trans. N.Z. Inst.* xv (1883) 335. U. bracteata *Col. l.c.* xvi (1884) 341. U. polyneura *Col. l.c.* xix (1887) 270. Carex uncinata *Linn. f. Suppl.* (1781) 413; *Forst. f. Prodr.* (1786) n. 338. U. uncinata *Kukenth. in Pflanzenr.* Heft 38 (1909) 62.

Var. **clavata** *Kukenthal MS.*—Spike clavate, often $\frac{1}{2}$ in. broad at the top of the female portion; glumes densely crowded. Other characters as in the type.

Var. **ferruginea** *C. B. Clarke MS.* — Agreeing with the type in size and habit, but glumes longer and narrower, sometimes twice the length of the utricle, lanceolate or subulate-lanceolate, chestnut-brown with a green usually 3-nerved keel. Utricles with a longer beak.—U. ferruginea *Boott in Hook. f. Fl. Nov. Zel.* i (1853) 288, t. 64B; *Handb. N.Z. Fl.* (1864) 309; *C. B. Clarke in Journ. Linn. Soc.* xx (1883) 394. U. nigra *Col. in Trans. N.Z. Inst.* xvii (1885) 253. U. variegata *Col. l.c.* xx (1888) 211.

Var. **pedicellata** *Petrie in Trans. N.Z. Inst.* xlvii (1915) 54.—Leaves often reddish, but by no means invariably so. Spike longer and narrower than in the type. Glumes somewhat shorter. Utricles more stipitate.—U. pedicellata *Kunkenth. in Pflanzenr.* Heft 38 (1909) 61.

North and South Islands, Stewart Island, Chatham Islands, Auckland Islands: The species and var. *pedicellata* abundant throughout; var. *ferruginea* not uncommon from Te Aroha southwards. Var. *clavata:* Near Wellington, *T. Kirk!* Otira Gorge, *T. Kirk! T. F. C.;* Mount Cook district, *T. F. C.* Sea-level to 3000 ft. November-February.

Easily recognized by the large size and very long cylindrical dense-flowered spike. I agree with Mr. Petrie in reducing Kukenthal's *U. pedicellata* to the position of a variety, for the differences between the two are very slight, and it is only in Stewart Island that *U. pedicellata* has a predominantly red colouration. Kukenthal's var. *laxior*, recorded by Carse (*Trans. N.Z. Inst.* xlviii (1916) 240) I cannot treat as more than a tall luxuriant form.

C. B. Clarke, Boeckeler, and Kukenthal all consider that *U. australis* extends to the Sandwich Islands. But Hawaiian botanists treat their plant as a different species, giving it the name of *U. Lindleyana* Kunth.

The oldest name of the species is *Carex uncinata* Linn. f. Kukenthal has therefore adopted the name of *Uncinia uncinata* in his monograph of the genus. But Persoon, who founded the genus, obtained his generic name by converting the adjective "uncinata" into the substantive "Uncinia." The meaning of the two words is identical, and the difference in orthography very small. The name "uncinata" Persoon rejected altogether, no doubt from its too close resemblance to Uncinia. It appears to me that such a name is in conflict with Rule 55 of the International Rules of Botanical Nomenclature, which provides that specific names shall be rejected when they merely repeat the generic name. I therefore retain the name of "australis" in this work.

9. **U. leptostachya** *Raoul Choix* (1846) 12, t. 5B. — Rhizome short. Culms densely tufted, slender, trigonous and scabrid above, leafy at the base, 1–2 ft. high; sheaths brown or purplish-red at the base. Leaves usually much longer than the culms, slender, flat, $\frac{1}{12}$–$\frac{1}{10}$ in. broad; margins scabrid. Spike 1½–5 in. long, very slender, lax-flowered; male portion short, almost filiform; bract setaceous or filiform, longer or shorter than the spike, sometimes wanting. Glumes laxly placed, often distant in the lower part of the spike, oblong-lanceolate, acute or obtuse, from ½ as long to as long as the utricle, green or purplish-red, 1-nerved on the back, membranous. Utricle narrow-lanceolate or almost fusiform, trigonous, distinctly scabrid above, faintly nerved; bristle twice as long as the utricle.—*Hook. f. Fl. Nov. Zel.* i (1853) 286; *Handb. N.Z. Fl.* (1864) 309; *C. B. Clarke in Journ. Linn. Soc.* xx (1883) 389; *Cheesem. Man. N.Z. Fl.* (1906) 803; *Kukenth. in Pflanzenr.* Heft 38 (1909) 62. U. scabra *Boott in Hook. f. Fl. Nov. Zel.* i (1853) 285. U. disticha *Col. in Trans. N.Z. Inst.* xx (1888) 210.

North and South Islands, Stewart Island.—From Mangonui southwards, not uncommon. Sea-level to 3000 ft. November–January.

The distinctly scabrid utricles at once separate this from all its allies. Its habit is that of coarse states of *U. riparia*. Kukenthal keeps up Boott's *U. distans* as a variety. I must confess my inability to find any distinguishing characters.

10. **U. riparia** *R. Br. Prodr.* (1810) 241. — Rhizome tufted. Culms slender, leafy, triquetrous, slightly scabrid above, 9–20 in. high. Leaves equalling or exceeding the culms, flat or slightly involute, $\frac{1}{20}$–$\frac{1}{10}$ in. broad, somewhat rigid; margins scabrid. Spike linear, 1½–4 in. long, lax and often interrupted below, denser above, $\frac{1}{8}$–$\frac{1}{6}$ in. broad; male portion variable in length; bract usually wanting, but sometimes present and exceeding the spike. Glumes lanceolate or oblong-lanceolate, subacute or obtuse, 1-3-nerved. Utricles exceeding the glumes, suberect, oblong-lanceolate, narrowed towards a spongy and stipitate base, faintly nerved, about ¼ in. long.—*Boott in Hook. f. Fl. Tasm.* ii (1860) 102, t. 152B; *Benth. Fl. Austral.* vii (1878) 432; *C. B. Clarke in Journ. Linn. Soc.* xx (1883) 392; *Cheesem. Man. N.Z. Fl.* (1906) 803; *Kukenth. in Pflanzenr.* Heft 38 (1909) 63. (?) U. obtusata *Col. in Trans. N.Z. Inst.* xvi (1884) 341.

Var. **affinis** *Colenso ex C. B. Clarke l.c.* 392.—Culms 12–24 in. high, weak. Spikes longer, 2–4 in., lax-flowered. Utricles longer than the glumes.—*Kukenth. l.c.* 63. U. laxiflora *Petrie in Trans. N.Z. Inst.* xvii (1885) 271. Barely separable as a variety.

Var. **Banksii** *C. B. Clarke in Journ. Linn. Soc.* xx (1883) 392.—Leaves narrower, almost filiform, $\frac{1}{30}$–$\frac{1}{20}$ in. broad. Glumes very short, often not more than half the length of the utricle.—U. Banksii *Boott in Hook. f. Fl. Nov. Zel.* i (1853) 287; *Handb. N.Z. Fl.* (1864) 310. U. capillaris *Col. in Trans. N.Z. Inst.* xx (1888) 210.

Var. **Hookeri** *Kukenth. in Pflanzenr.* Heft 38 (1909) 63.—Culms smaller, 3–8 in. long, weak, smooth. Spike continuous, 1¼–1¾ in. long. Glumes chestnut. Utricles equalling the glumes.—U. Hookeri *Boott in Hook. f. Fl. Antarct.* i (1844) 91, t. 51.

North and South Islands, Stewart Island: The typical state from the Pirongia Mountain and Taranaki southwards; var. *affinis* with much the same distribution, but not so plentiful; var. *Banksii* from the North Cape to Foveaux Strait, but most common in the north; var. *Hookeri* abundant in the Auckland, Campbell, and Antipodes Islands, Macquarie Island.

The best characters of this variable plant are the tall leafy habit, narrow flat leaves, long and linear very lax spike, and pale glumes nearly always shorter than the

utricles. The two varieties *affinis* and *Banksii* differ very slightly from the type; but var. *Hookeri* is more distinct. On the whole, however, I think that Kukenthal is right in regarding it as a variety of *U. riparia*.

In addition to the mainland of New Zealand and the islands to the south of it, *U. riparia* has been recorded from Australia and Tasmania, New Guinea, and Lord Howe Island.

11. **U. rubra** *Boott in Hook. f. Fl. Nov. Zel.* i (1853) 287, t. 64, f. A.—Whole plant red, red-purple, or brownish-red, usually forming a continuous sward. Culms 6–14 in. high, stout or slender, strict, rigid, leafy at the base, trigonous and scabrid above. Leaves much shorter than the culms, rarely equalling or exceeding them, flat or slightly involute, rigid or submembranous, striate, $\frac{1}{20}$–$\frac{1}{15}$ in. broad; margins scabrid. Spike 1–2 in. long, rigid, linear, lax, continuous or slightly interrupted towards the base; male portion short; bract wanting. Glumes oblong-lanceolate, acute or obtuse, rigid, red or red-brown, slightly exceeding the utricle, obscurely 1-nerved on the back. Utricle lanceolate, tapering at both ends, glabrous, faintly nerved, about $\frac{1}{5}$ in. long; bristle nearly twice as long as the utricle.—*Hook. f. Handb. N.Z. Fl.* (1864) 310; *C. B. Clarke in Journ. Linn. Soc.* xx (1883) 390; *Cheesem. Man. N.Z. Fl.* (1906) 804; *Kukenth. in Pflanzenr.* Heft 38 (1909) 64.

Var. **fallax** *Kukenth. in Pflanzenr.* Heft 38 (1909) 64. — Culms more slender. Leaves usually equalling the culms, $\frac{1}{18}$ in. broad, less rigid.

North Island: Elevated districts of the interior, from the Upper Waipa, Waimarino, and Taupo southwards. South Island, Stewart Island: Not uncommon in mountain districts, descending to sea-level in Stewart Island.

Closely allied to *U. riparia*, but usually well distinguished by the bright-red colour, the rigid terete culms, and the shorter leaves, which seldom equal the culms.

12. **U. strictissima** *Petrie in Trans. N.Z. Inst.* xlvii (1915) 55.—Dark-reddish or greenish-brown, very densely tufted, forming tussocks similar to those of a *Juncus*. Culms 15–25 in. high, strict, firm, erect, deeply grooved, scabrid above. Leaves equalling the culm or rather shorter, flat or deeply concave, $\frac{1}{20}$–$\frac{1}{15}$ in. broad, striate, greenish or reddish-brown, the sheaths more or less rubescent; margins and midrib scabrid. Spike $1\frac{1}{2}$–3 in. long, narrow-linear, slender, rigid, lax-flowered; male portion very short and slender. Bract leafy, from $1\frac{1}{2}$ to twice as long as the spike. Glumes oblong-lanceolate, obtuse or acute, closely appressed, reddish or brownish-green, margins often scarious. Utricle usually longer than the glume, lanceolate, tapering at both ends, faintly nerved. Bristle usually twice as long as the utricle.—U. rigida *Petrie in Trans. N.Z. Inst.* xvii (1885) 271 (*not of Boeck.*). U. rubra *var.* rigida *Cheesem. Man. N.Z. Fl.* (1906) 804. U. rubra *var.* strictissima *Kukenth. in Pflanzenr.* Heft 38 (1909) 64.

South Island, Stewart Island, Auckland Islands: Probably not uncommon from the Clarence Valley southwards, ascending to 3000 ft.

Ann. Sc. Nat. 1948: 2: 117.

13. **U. rupestris** *Raoul Choix* (1846) 13, t. 5A. — Culms densely tufted, smooth, slender, leafy, 4–8 in. high, clothed with sheathing scales at the base. Leaves usually longer than the culms, flat or slightly involute, rigid, channelled, $\frac{1}{25}$–$\frac{1}{15}$ in. broad; margins scabrid. Spike 1–$1\frac{1}{2}$ in. long, narrow linear-oblong, rather dense, male portion short but evident; bract often wanting, but sometimes present and exceeding

the spike. Glumes lanceolate, acute, shining-brown or chestnut, faintly 3-nerved; margins pale. Utricles lanceolate, quite glabrous, faintly nerved, about $\frac{1}{5}$ in. long; bristle about twice as long as the utricle.—*Boott in Hook. f. Fl. Nov. Zel.* i (1853) 286; *Handb. N.Z. Fl.* (1864) 310; *C. B. Clarke in Journ. Linn. Soc.* xx (1883) 395; *Cheesem. Man. N.Z. Fl.* (1906) 804; *Kukenth. in Pflanzenr.* Heft 38 (1909) 64.

South Island: Nelson—Mount Arthur Plateau, *T. F. C.* Canterbury—Akaroa, *Raoul.* Ascends to 4000 ft. on the Mount Arthur Plateau.

Whether the *U. rupestris* of Raoul is really conspecific with my plant from Mount Arthur is a question that cannot be settled until some botanist rediscovers Raoul's type. Species of *Uncinia* are by no means easily exterminated, and I entertain little doubt that it still exists at Akaroa, and could be found by a careful search.

14. **U. filiformis** *Boott in Hook. f. Fl. Nov. Zel.* i (1853) 286.—Culms densely tufted, extremely slender, filiform, 3–9 in. high, leafy towards the base. Leaves usually much exceeding the culms, very slender, filiform, $\frac{1}{50}$–$\frac{1}{30}$ in. broad; margins involute, scabrid. Spike $\frac{1}{2}$–$1\frac{1}{2}$ in. long, extremely slender, linear, lax, $\frac{1}{15}$–$\frac{1}{10}$ in. broad; bract filiform, exceeding the spike. Glumes oblong-lanceolate, acute or acuminate, membranous, pale, equalling the utricles or nearly so. Utricles $\frac{1}{8}$–$\frac{1}{6}$ in. long, lanceolate, acuminate, smooth and glabrous, faintly nerved; bristle twice as long as the utricle.—*Hook. f. Handb. N.Z. Fl.* (1864) 310; *C. B. Clarke in Journ. Linn. Soc.* xx (1883) 391; *Cheesem. Man. N.Z. Fl.* (1906) 805; *Kukenth. in Pflanzenr.* Heft 38 (1909) 66.

North Island: Pirongia Mountain, *T. F. C.* Hawke's Bay—Ruahine Mountains, *Colenso* n. 1641! (*type of the species*), *H. Hill! Petrie!* Taranaki—Mount Egmont, *Petrie!* Wellington—Tararua Mountains, *H. H. Travers! T. P. Arnold! B. C. Aston! Petrie!* South Island: Not uncommon in mountain woods. Stewart Island: Abundant. 1000–4500 ft.

As I possess one of Colenso's specimens (No. 1641), selected by Dr. Boott as the type of the species, I feel confident as to its determination. Usually it can be recognized without much difficulty by its small size and very slender habit, filiform convolute leaves, small slender spikes, and small narrow utricles, which only slightly exceed the glumes. But large specimens trend towards *U. riparia*, and are sometimes difficult to separate from that plant.

Mr. C. B. Clarke referred the Lord Howe Island *U. debilior* F. Muell. to *U. filiformis*. Judging from descriptions alone, it is a much larger and coarser plant, and I am inclined to think that Kukenthal is more likely to be correct in placing it under *U. riparia*.

14. **CAREX** Linn. 1735.

Perennial herbs. Culms erect, more or less trigonous or rarely terete, often scabrid on the angles. Leaves mostly radical, grass-like, usually scabrid on the margins and keel. Spikelets unisexual or bisexual, rarely dioecious, solitary or more commonly arranged in clusters or spikes, racemes or panicles, all androgynous or the upper male with rarely a few female flowers at the top or base, the lower female often with a few male flowers at the base or top. Glumes imbricate all round the axis. Male flowers of 3 stamens, without perianth or hypogynous bristles. Female flowers consisting of a compressed or trigonous ovary, included in a flask-shaped or urceolate 2-toothed organ called the utricle or perigynium; style-branches 2 or 3, long, filiform, protruding beyond the utricle. Nut lenticular or plano-convex or trigonous, enclosed in the persistent more or less enlarged utricle.

Key to Carices of Malaysia & Polynesia

CARICES

REVISIONS and ADDITIONS

Transactions Vol.81. part 2. page 157. V.J.Cook.

Carex inopinata sp.nov.

C. capillacea Boott. new record.

C. demissa Hornem " "

C. pallescens L. " "

C. scoparia Schkuhr. " "

Transactions. Vol. 82. part 1. page 49. Hamlin.

Carex ternaria = geminata Schkuhr.

C. ternaria var. gracilis = C. confusa

C. ternaria var. pallida = C. coriacea sp. nov.

} The 'ternaria' complex again revised in Vol. 85. see below.

C. gaudichaudiana new key.

C. sinclairii " "

C. subdola " "

Transactions Vol. 84. part 4.page 681. Hamlin.

Carex raoulii = C. MaMahonii

C. goyenii = C. raoulii

C. fascicularis = C. pseudocyperus var. fascicularis.

C. maorica

C. pseudocyperus (not in N.Z.) key given.

Transactions Vol. 85. part 3. page 387. Hamlin.

Carex forsterii C. cockayniana

C. elingamita sp. nov. C. vacillans.

C. kermadecensis Petrie

C. ternaria now C. lessoniana Steud.
C. ternaria var. gracilis now C. geminata
C. ternaria var. pallida " C. coriacea sp.nov.
C. darwinii var.aristata " C. ternaria Forst.

Key to Carices of Malaysia & Polynesia
see B. Nelmes. Kew Bull. 1935
p. 8

An immense genus of probably over 1000 species, of world-wide distribution, but ıst abundant in temperate regions, rare in the tropics, save on high mountains. Of ə 55 species found in New Zealand, no less than 37 are endemic, the remaining 18 ing mostly widely spread.

In revising the New Zealand species for this edition I have found Dr. Kukenthal's .onograph of the genus, issued as Heft 38 of the Pflanzenreich, of very great assistance. t the same time, I have been unable to follow him in all his conclusions. Few New ɔaland botanists will agree with him in reducing *Carex secta*, *C. virgata*, and . *appressa* to one species; or in uniting *C. Cockayniana* and *C. semi-Forsteri* to . *Forsteri*; and there are similar instances of less moment. But these are matters of inor importance, and do not detract from the many excellencies of the work.

Several species of *Carex* have become naturalized in New Zealand. Among these ay be mentioned the European *C. divisa* Huds.; *C. muricata* L.; *C. flacca* Schreb. *!. glauca* Scop.); *C. panicea* L.; and the Australian *C. longifolia* R. Br.

(see Kukenthal's Key)

ection I. Spikelet solitary, simple, terminal.

eaves flat, grassy. Spikelet oblong, many-flowered. Bract short or wanting .. .. 1. *C. pyrenaica.*

eaves terete, strict and wiry. Spikelet ovoid, few-flowered. Bract long .. .. 2. *C. acicularis.*

eaves filiform, flaccid. Spikelet ovoid. Bract wanting .. 3. *C. Wallii.*

c. Enysii, petrie. n.sp.

'ection II. Spikelets several or many, androgynous or rarely dioecious, sessile, arranged in a compact or more or less interrupted spike, less often in a dense or rarely lax panicle. Styles 2.

* Male flowers at the top of the spikelets.

ɜmall, $\frac{1}{2}$–2 in. Spikelets 2–4, compacted into an ovoid head $\frac{1}{4}$–$\frac{1}{3}$ in. long. Utricles elliptic-ovoid, conspicuously winged .. 4. *C. pterocarpa.*

ɜlender, 2–12 in. Leaves almost filiform. Spikelets 3–8, in a dense or lax spike $\frac{1}{2}$–1 in. long. Utricles ovate-lanceolate, beaked, nerved, minutely papillose .. .. .. 5. *C. Kirkii.*

Usually stout, 6–14 in. Leaves flat, grassy. Spikelets 4–10 in a dense spike $\frac{1}{2}$–1 in. long. Utricles ovoid, beaked, strongly nerved, minutely papillose .. .. 6. *C. trachycarpa.*

ɜlender, strict, wiry, 6–18 in. Spikelets 6–10 in a linear spike $\frac{1}{2}$–$1\frac{1}{2}$ in. long. Utricles narrow-lanceolate, nerved, winged above, tapering into a long subulate beak .. .. 7. *C. Muelleri.*

ɜlender 1–3 ft. Spikelets many, in a lax panicle, 4–9 in. long, sometimes reduced to a spike 3–5 in. Utricles narrow-lanceolate, tapering into a long subulate beak .. .. .. 8. *C. kaloides.*

ɜlender, laxly tufted, 1–2 ft. Spikelets many, in a dense or interrupted oblong spike $\frac{3}{4}$–$1\frac{1}{4}$ in. long. Utricles ovoid, swollen at the base, shining, ribbed on the back, contracted into a rather long beak .. .. 9. *C. diandra.*

Stout, harsh, 1–3 ft. Culms acutely triquetrous. Leaves $\frac{1}{5}$–$\frac{1}{2}$ in. broad. Spikelets many, in a stout spike-like panicle 3–7 in. long. Utricles ovoid, conspicuously nerved .. .. 10. *C. appressa.*

Slender, harsh, 1–3 ft. Leaves $\frac{1}{8}$–$\frac{1}{4}$ in. broad. Spikelets many, in a linear spike-like panicle 6–18 in. long. Utricles ovoid, conspicuously nerved .. .. 11. *C. virgata.*

Slender, drooping, 2–4 ft. Spikelets very numerous in a much and laxly branched nodding panicle 1–$2\frac{1}{2}$ ft. long. Utricles broadly ovoid, smooth or indistinctly nerved .. .. 12. *C. secta.*

** Male flowers at the base of the spikelets.

Slender, 4–18 in. Leaves flat, grassy. Spikelets 2–5, pale-green, compacted into a short head or spike. Utricles ovoid, nerved, narrowed into a long beak .. .. 13. *C. inversa.*

Small, depressed, $\frac{1}{2}$–3 in. Leaves involute, wiry. Spikelets 2–3 or solitary. Utricles ovoid at the base; beak very long .. 14. *C. resectans.*

Slender, 3–14 in. Leaves involute, wiry. Spikelets 2–4, brown, compacted into a short head. Utricles broadly ovoid, smooth, nerveless, not beaked .. .. 15. *C. Colensoi.*

Slender, 4–18 in. Leaves flat, grassy. Spikelets 3–5, green, approximate or a little remote. Utricles spreading, narrow-ovoid, spongy at the base, nerved, beaked .. .. 16. *C. stellulata.*

Short, 2–8 in. Leaves flat, grassy. Spikelets 2–4, red-brown, in a dense spike ½ in. long. Utricles elliptic-ovoid, not winged, faintly nerved; beak short .. .. 17. *C. lagopina.*

Stout or slender, 6–18 in. Leaves flat, grassy. Spikelets 4–6, brownish-green, compacted into a lobed spike ¾–1 in. long. Utricles elliptic-ovoid, winged, narrowed into a long beak .. 18. *C. leporina.*

Section III. Spikelets distinct, usually stalked, unisexual; the male spikelets constantly uppermost, rarely mixed with female flowers; the lower spikelets all female or with a few male flowers at the base or apex.

* Styles 2. Nut lenticular or biconvex, not trigonous.

† Female spikelets with the male flowers (when present) at the top of the spikelet, very rarely below. Utricles much compressed, conspicuously nerved; beak very short, with an entire or very minutely 2-toothed mouth.

Culms 3–14 in. Spikelets 3–5, ¼–¾ in. long, sessile or the lowest very shortly stalked. Glumes obtuse. Utricles minutely granular-papillose .. .. 19. *C. Gaudichaudiana.*

Culms 1–2 ft. Spikelets 4–8, 1–3 in. long, the lower ones stalked. Glumes mucronate or even aristate .. .. .. 20. *C. subdola.*

Culms 1–3 ft. Spikelets 6–15. Glumes black-red. Utricles plano-convex, 3–5-nerved on each face .. .. .. 21. *C. Darwinii.*

Culms tall, stout or slender, 1–4 ft. Basal leaf-sheaths transversely fibrillose. Spikelets 8–24, 1–4 in. long, geminate or ternate or quinate, long-stalked and pendulous. Glumes aristate .. .. 22. *C. ternaria.*

Culms slender, 6–18 in. Basal leaf-sheaths not transversely fibrillose. Spikelets 4–6, ½–1½ in. long, solitary or the upper geminate. Glumes scarcely mucronate. Utricle not granular-papillose .. .. 23. *C. Sinclairii.*

†† Female spikelets with the male flowers (when present) at the base of the spikelet, very rarely at the top. Utricle plano-convex or unequally biconvex, beak obviously 2-toothed.

a. Terminal spikelet always mixed with female flowers.

Culms laxly tufted, 9–18 in. Leaves broad, ⅛–¼ in. Spikelets 4–8, stout. Utricles elliptic, sharply serrate above .. 24. *C. Raoulii.*

b. Terminal spikelet very rarely mixed with female flowers.

Culms slender, 1–2 ft. Spikelets 4–7, ½–1 in. long. Glumes orbicular-ovate, obtuse. Utricles densely packed, spreading when ripe, unequally biconvex; margins smooth .. .. 25. *C. dipsacea.*

Culms filiform, 6–18 in., often elongating and prostrate in fruit. Spikelets 3–5, ½–1 in. long, approximate. Utricles plano-convex or nearly so, obscurely nerved; margins serrate above 26. *C. testacea.*

Culms rather stout, 4–8 in., much overtopped by the leaves. Spikelets 3–6, closely approximate, ⅓–1 in. long. Utricles elliptic-ovoid, strongly nerved, unequally biconvex; margins usually smooth .. .. 27. *C. Wakatipu.*

Culms laxly tufted, 6–18 in. Leaves short. Spikelets 2–4, male very stout, clavate. Utricles elliptic-ovoid, unequally biconvex, strongly nerved, purplish-black .. .. 28. *C. devia.*

Culms very slender, 6–18 in., often elongating in fruit. Leaves long, flat, keeled. Spikelets 4–8, ½–2 in. long, narrow; male slender. Utricles narrow-elliptic, turgid, obscurely nerved; margins smooth .. .. 29. *C. lucida.*

Culms reddish, densely tufted, 1–2 ft. Leaves strict, semiterete. Spikelets 4–6, ½–1½ in. long. Glumes pale. Utricles elliptic, plano-convex; margins serrate .. .. 30. *C. Buchanani.*

Culms very short, 1–4 in. Spikelets 4–5, $\frac{1}{5}$–$\frac{1}{3}$ in. long, approximate, almost concealed by the leaves. Utricles narrow elliptic-ovoid, plano-convex, narrowed into a long acutely bidentate beak .. .. 31. *C. cirrhosa.*

* Styles 3. Nut trigonous. (Styles often 2 in *C. Berggreni.*)

† Utricles glabrous (or the margins serrate above), hardly spreading when ripe.

a. Small species. Culms 1–5 in. high, overtopped by the leaves. Spikelets 2–4, closely approximate, often concealed by the leaves.

Reddish. Culms very short, $\frac{1}{2}$–$1\frac{1}{2}$ in. Leaves 1–2 in. × $\frac{1}{15}$–$\frac{1}{12}$ in., linear, flat, obtuse. Utricles elliptic, biconvex or obscurely trigonous; margins smooth; beak short. Styles often 2 .. 32. *C. Berggreni.*

Green. Culms 1–3 in. Leaves $\frac{1}{20}$ in. broad, acute. Utricles narrow-ovoid, trigonous; margins serrate; beak rather long .. 33. *C. Hectori.*

Glaucous-green. Culms 1–3 in. Leaves 2–6 in. × $\frac{1}{25}$–$\frac{1}{15}$ in. Utricles broadly ovoid, plano-convex; margins serrate; beak short .. .. 34. *C. decurtata.*

Culms filiform, $1\frac{1}{2}$–4 in. Leaves 4–8 in., very narrow. Utricles elliptic, turgid, plano-convex, beak short .. .. .. 35. *C. filamentosa.*

Brownish-red or green. Culms 1–5 in. Leaves much longer, 3–10 in. × $\frac{1}{30}$–$\frac{1}{15}$ in.; tips often curled and twisted. Utricles elliptic-oblong, trigonous; margins smooth; beak very short 36. *C. uncifolia.*

b. Slender; culms 6–16 in. high. Leaves narrow, $\frac{1}{30}$–$\frac{1}{12}$ in. broad, plano-convex or nearly so. Male spikelets solitary.

Culms 4–10 in. Leaves usually shorter, narrow. Spikelets 3–5, distant. Utricles narrow-ovoid, trigonous; margins smooth; beak short .. .. 37. *C. Dallii.*

Culms 5–15 in. Leaves with broad sheathing bases, tips curled and twisted. Glumes pale. Utricles narrow-ovoid, unequally biconvex; margins smooth; beak short .. .. .. 38. *C. Petriei.*

Culms 6–18 in., filiform. Leaves shorter or longer than the culms. Utricles elliptic-lanceolate, plano-convex; margins sharply serrate; beak long .. .. 39. *C. comans.*

Culms 9–24 in. Spikelets 3–5, short, broad. Utricles broadly ovoid, turgid, biconvex; margins smooth; beak short .. 40. *C. litorosa.*

c. Tall, stout or slender; culms 1–3 ft. high or more. Leaves flat or keeled, $\frac{1}{8}$–$\frac{1}{2}$ in. broad. Male spikelets usually more than one (except in C. dissita).

Culms stout or slender, 1–$2\frac{1}{2}$ ft. Leaves $\frac{1}{4}$–$\frac{1}{3}$ in. broad. Spikelets 4–8, distant, on short peduncles, the lower rarely compound. Male spikelet solitary .. .. 41. *C. dissita.*

Culms slender, 2–3 ft., often elongating in fruit. Leaves $\frac{1}{10}$–$\frac{1}{6}$ in., keeled. Spikelets 5–10, distant; terminal 2–4 male; female slender, pendulous on long filiform peduncles, lower often compound .. .. 42. *C. Solandri.*

Culms stout. Leaves broad. Spikelets 8; terminal 2–3 male; females erect on short peduncles, not compound .. .. 43. *C. ventosa.*

Culms stout, 2–3 ft. Leaves $\frac{1}{8}$–$\frac{1}{5}$ in. broad. Spikelets 5–7; 2 terminal male; female short and stout, $\frac{1}{3}$ in. diam., the lowest remote. Utricles ovoid .. .. 44. *C. longiculmis.*

Culms $1\frac{1}{2}$–2 ft. Leaves $\frac{1}{4}$ in. broad. Spikelets 6–7, 1–$2\frac{1}{2}$ in. long, 3 uppermost male. Glumes linear-lanceolate. Utricles turgidly biconvex, 2-nerved, beak short .. .. .. 45. *C. Chathamica.*

Culms very tall and robust, 2–4 ft. Leaves $\frac{1}{3}$–$\frac{1}{2}$ in. broad. Spikelets 6–12, 2–5 in. long, very stout; terminal 2–4 male. Utricles stipitate, obovoid-oblong .. .. .. 46. *C. trifida.*

†† Utricles pubescent, hardly spreading when ripe; beak short. Nut with a swollen style-base.

Culms 1–4 in. high, overtopped by the leaves. Spikelets 2–5, small, green, closely approximate .. .. .. 47. *C. breviculmis.*

Carex lanata in Forst. Fl. 1786 92. N. Sel. non Mud.

††† Utricles glabrous, spreading when ripe; beak short.

Rhizome long, creeping. Culms 4–8 in. Leaves much longer, glaucous. Spikelets 3–6. Utricles large, ¼ in. long, ovoid, turgid, corky, smooth .. .. 48. *C. pumila.*

Rhizome tufted. Culms 6–16 in., slender. Leaves shorter. Spikelets 3–4, small. Utricles ⅛ in. long, broadly oblong, turgid, strongly nerved, dark-brown .. .. .. 49. *C. Brownii.*

†††† Utricles glabrous, spreading when ripe (except in *C. vacilans*), strongly costate-nerved, narrowed into a long and slender acutely 2-toothed beak (beak shorter and obscurely toothed in *C. Cockayniana*).

Yellowish-green. Culms 2–8 in. Spikelets 3–8, small, stout, approximate. Utricles suddenly narrowed into a long beak 50. *C. Oederi.*

Culms slender, 1–2 ft. Leaves harsh. Spikelets 4–9, distant, very slender, about ⅛ in. broad. Utricles fusiform, hardly spreading .. .. 51. *C. vacilans.*

Culms rather slender, 1–2 ft. Leaves harsh. Spikelets 5–8, distant, ⅕–¼ in. broad; terminal one often mixed with female flowers. Utricles elliptic-lanceolate; beak short, obscurely 2-toothed .. .. 52. *C. Cockayniana.*

Culms stout or slender, 1–3 ft. Leaves harsh. Spikelets 5–9, distant or the upper approximate; terminal one always largely mixed with female flowers. Utricles elliptic-lanceolate; beak long .. .. 53. *C. semi-Forsteri.*

Culms stout, 1½–3 ft. Leaves harsh. Spikelets 5–9, distant; terminal 1–3 wholly male. Utricles elliptic-oblong; beak long 54. *C. Forsteri.*

Culms stout or slender, 1–3 ft. Leaves soft, grassy. Spikelets 3–5, approximate or the lowermost remote; terminal one male. Utricles ovate-lanceolate, stipitate; beak long, linear, with 2 almost pungent teeth .. .. 55. *C. pseudo-cyperus.*

1. **C. pyrenaica** *Wahl. in Vet. Akad. Nya Handl. Stockh.* xxiv (1803) 139.—Culms slender, densely tufted, leafy at the base, 2–9 in. high, rarely more. Leaves numerous, longer or shorter than the culms, flat, grassy, $\frac{1}{25}$–$\frac{1}{15}$ in. broad, grooved beneath; margins scabrid. Spikelet solitary, terminal, dark chestnut-brown, ⅓–¾ in. long, oblong or elliptic-oblong, densely many-flowered; male flowers at the top; bract wanting or very short. Glumes membranous, deciduous; of the female flowers ovate or ovate-oblong, acute or obtuse, shorter than the utricle; of the males narrower, linear-oblong, subacute. Utricle stipitate, lanceolate or almost fusiform, gradually narrowed into an obliquely bifid beak, unequally biconvex or almost plano-convex, smooth, spreading or reflexed when ripe. Styles usually 2 in New Zealand examples, usually 3 in European or American. Nut oblong, lenticular.—*Hook. f. Fl. Nov. Zel.* i (1853) 280; *Handb. N.Z. Fl.* (1864) 312; *Boott Ill. Car.* iv (1867) 148, t. 475–76; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 424; *Man. N.Z. Fl.* (1906) 810; *Kukenth. in Pflanzenr.* Heft 38 (1909) 104.

Var. **cephalotes** *Kukenth. l.c.* 106.—Spikelet ovate or subglobose, much smaller. Utricle broader than in the typical form.—C. cephalotes *F. Muell. in Trans. Phil. Soc. Vict.* i (1855) 110.

North Island: Mounts Tongariro and Ruapehu, *Cockayne, T. F. C.;* Ruahine Mountains, *Colenso! E. W. Andrews!* South Island: Nelson—Mount Arthur, Mount Peel, Raglan Mountains, *T. F. C.* Canterbury—Mountains above Arthur's Pass, Mount Dobson Range, Mount Cook district, *T. F. C.* Westland—Kelly's Hill, *Petrie!* Otago—Mountains of the Lake district, *Buchanan!* common on the higher mountains of the central and western districts, *Petrie!* McKinnon's Pass, *F. G. Gibbs!* 3500–6500 ft. December–March.

C. pyrenaica is found on high mountains in most parts of the world. Var. *cephalotes* is only known in Australia and New Zealand, and in the latter country has only been collected on Mount Cardrona and the Remarkables, in Central Otago.

2. **C. acicularis** *Boott in Hook. f. Fl. Nov. Zel.* i (1853) 280, t. 63c.—Culms slender, strict, wiry, terete, densely tufted, leafy at the base, 1–6 in. high. Leaves shorter than the culms or equalling them, narrow, strict, rigid, straight or curved, almost terete, grooved down the front, obtuse and slightly scabrid at the tip. Spikelet small, solitary, terminal, $\frac{1}{6}$–$\frac{1}{3}$ in. long, broadly ovoid, red-brown, few-flowered; females 2–8; males 2–4 at the top of the spikelet. Glumes lanceolate or ovate-lanceolate, acute or the lower ones awned, keel green or pale-brown. Utricle shortly stipitate, lanceolate, narrowed above into a rather long beak, obtusely triquetrous; beak serrate, obliquely bifid at the tip. Styles 3, seldom 2. Nut pale, trigonous.—*Boott Ill. Car.* iv (1867) 157, t. 508, f. 2; *Hook. f. Handb. N.Z. Fl.* (1864) 312; *Benth. Fl. Austral.* vii (1878) 437; *Cheesem. in Trans. N.Z. Inst.* xv (1884) 424; *Man. N.Z. Fl.* (1906) 810; *Kukenth. in Pflanzenr.* Heft 38 (1909) 100. C. Archeri *Boott in Hook. f. Fl. Tasm.* ii (1860) 98, t. 160; *Ill. Car.* iv (1867) 156, t. 508, f. 3. C. inconspicua *Col. in Trans. N.Z. Inst.* xviii (1896) 612.

North Island: Mount Hikurangi, *Adams* and *Petrie!* Tongariro, *Herb. Colenso!* Ruahine Mountains, *Colenso! Olsen! E. W. Andrews!* Tararua Mountains, *Petrie!* South Island: Not uncommon on the mountains of Nelson, Canterbury, and Westland. Otago—Mountains above Lake Harris, *T. Kirk!* Old Man Range, *Petrie!* 2500–5000 ft. December–March.

Easily distinguished from *C. pyrenaica* by the strict nearly terete leaves, smaller few-flowered spikelet, and erect subulate bract. It is also found in Victoria and Tasmania.

3. **C. Wallii** *Petrie in Trans. N.Z. Inst.* liii (1921) 371.—A slender more or less matted plant. Leaves few, filiform, flaccid, flat or more or less folded, striate, finely scaberulous towards the tips, $2\frac{1}{2}$ in. long or less. Culms much exceeding the leaves, suberect, more or less curved, glabrous, filiform, more or less trigonous, flaccid, 5 in. long or more. Spikelet solitary, terminal, small, ovoid, ebracteate, $\frac{1}{6}$ in. long; the upper flowers male, the lower female. Glumes of the female flowers membranous; broadly ovate, subacuminate, pale-green, the margins more or less scarious. Utricles longer than the glumes, semiterete or broadly biconvex, slightly winged, faintly 5-nerved on the back, ovate at the base, gradually narrowed above into a slender short entire beak; style-branches 3; nut more or less triquetrous.

South Island: Wet ground at Centre Hill, Southland, *A. Wall.*

Apparently a very distinct species, belonging to the section *Primocarex*, of which *C. pyrenaica* and *C. acicularis* are the only representatives previously known from New Zealand. I have only seen a few scraps, and have consequently largely availed myself of Mr. Petrie's description.

4. **C. pterocarpa** *Petrie in Trans. N.Z. Inst.* xxxi (1899) 353.—A dwarf species, forming depressed patches 3–5 in. diam. Rhizome stout, creeping, clothed with dark-brown scales. Culms very short, stout, densely tufted, $\frac{1}{2}$–1 in. long, rarely more. Leaves sheathing the culms to the top and much exceeding them, $\frac{1}{2}$–2 in. long, $\frac{1}{12}$–$\frac{1}{8}$ in. broad, tapering upwards to an acute point, somewhat rigid and coriaceous, flat or involute, deeply grooved; margins scabrid above. Spikelets 2–4, compacted into a broadly ovoid head $\frac{1}{4}$–$\frac{1}{2}$ in. long, androgynous, pale brownish-green, $\frac{1}{6}$–$\frac{1}{5}$ in. long; lowest bract usually with a foliaceous tip. Glumes ovate, acute, membranous, with a pale-green centre and brown margins. Male flowers at the top of the spikelets, female flowers below. Utricle elliptic-ovoid, plano-convex,

conspicuously winged, strongly nerved, narrowed upwards into a bifid beak; margins and beak serrulate. Styles 2. Nut broadly oblong, lenticular.—*Cheesem. Man. N.Z. Fl.* (1906) 811; *Kukenth. in Pflanzenr.* Heft 38 (1909) 140. C. Thomsoni *Petrie in Trans. N.Z. Inst.* xviii (1886) 298 (*not of Boott*).

South Island: Otago—Hector Mountains, Mount Pisa, Old Man Range, *Petrie!* 4500–6500 ft.

A very distinct little plant.

5. **C. Kirkii** *Petrie in Trans. N.Z. Inst.* xviii (1886) 297.—Rhizome stout, woody, creeping. Culms short, densely tufted, slender, smooth, leafy throughout, $\frac{1}{2}$–3 in. high. Leaves sheathing the whole or greater part of the culm and much longer than it, 2–6 in. long, pale-green, involute, filiform, usually strict and wiry. Spikelets 3–5, compacted into a dense oblong spike $\frac{1}{4}$–$\frac{1}{2}$ in. long, sessile, androgynous, pale-green, few-flowered, $\frac{1}{6}$–$\frac{1}{4}$ in. long; bract usually foliaceous. Glumes ovate-lanceolate, acute or acuminate, membranous, with a green midrib and pale margins. Male flowers 2–3 at the top of the spikelets, sometimes absent in the lower ones; female flowers 3–5 at the base. Utricle ovate-lanceolate, plano-convex, narrowed into a rather long bifid beak, strongly nerved, coriaceous, minutely papillose all over; margins and beak very finely crenulate. Styles 2. Nut broadly oblong, lenticular.—*Cheesem. Man. N.Z. Fl.* (1906) 811; *Kukenth.* in *Pflanzenr.* Heft 38 (1909) 140.

Var. **membranacea** *Kukenthal MS.* — Taller. Leaves 6–10 in. long, sheathing nearly the whole of the culm and twice as long as it. Spikelets 5–6, forming a loose spike $\frac{3}{4}$–1 in. long. Utricle more membranous, narrower, with a longer and more tapering beak.

Var. **elatior** *Kukenthal MS.* — Still taller, the culms 6–12 in. long, the upper half not sheathed by the leaves. Leaves 9–18 in. long, broader, sometimes $\frac{1}{15}$ in., flat or involute at the base. Spikelets 4–8 in a lax spike $\frac{3}{4}$–$1\frac{1}{2}$ in. long, the lowest sometimes remote. Utricle as in var. *membranacea*, but more coriaceous.

South Island: The typical form apparently not uncommon in mountain districts from the Clarence Valley to the south of Otago. Var. *membranacea:* Mount Arthur Plateau, *T. F. C.* Var. *elatior:* Mount Arthur Plateau, *T. F. C.*; Mount St. Bathan's (Otago), *Petrie!* 2500–4500 ft. December–March.

An exceedingly variable plant. Depauperated states, with few-flowered spikelets, are easily mistaken for *C. resectans*, although the position of the male flowers at once separates the two plants. Var. *elatior* approaches *C. trachycarpa*, but is smaller and more slender, with narrower leaves, the inflorescence is much more lax, and the utricles are smaller and narrower.

6. **C. trachycarpa** *Cheesem. in Trans. N.Z. Inst.* xxiv (1892) 413.—Culms densely tufted, stout or rather slender, trigonous, scabrid above, 6–14 in. high. Leaves longer or shorter than the culms, flat, grassy, striate, $\frac{1}{12}$–$\frac{1}{8}$ in. broad; margins slightly scabrid above. Spikelets 4–10, compacted into an oblong or linear-oblong spike $\frac{1}{2}$–1 in. long, androgynous, brown or pale-brown, ovoid, $\frac{1}{6}$–$\frac{1}{3}$ in. long; lowest bract leafy, shorter or longer than the spike. Glumes ovate, acuminate or awned, pale-chestnut or pale-brown, with pale-green midribs and hyaline margins. Male flowers at the top of the spikelets, usually few. Utricle ovoid, plano-convex, narrowed into a short bifid beak, strongly nerved, minutely papillose all over; margins finely crenulate above. Styles 2. Nut oblong, lenticular. —*Cheesem. Man. N.Z. Fl.* (1906) 812; *Ill. N.Z. Fl.* ii (1914) t. 214; *Kukenth. in Pflanzenr.* Heft 38 (1909) 152. C. muricata *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 411, 427.

SOUTH ISLAND: Nelson—Mount Arthur, Mount Peel, Mount Owen, *T. F. C.*; Mount Mantell, *W. Townson!* 3000–4500 ft. December–March.

In my revision of the New Zealand species I erroneously referred this to *C. muricata*, from which it differs altogether in the much smaller differently shaped utricles, which do not spread when ripe, and are minutely papillose on both surfaces.

7. **C. Muelleri** *Petrie in Trans. N.Z. Inst.* xviii (1886) 298. — Pale whitish-green. Rhizome stout, woody, creeping, clothed with brownish sheathing scales. Culms densely tufted, slender, strict and wiry, terete below, compressed or plano-convex above, grooved, perfectly smooth, 6–24 in. high. Leaves shorter than the culms, narrow, $\frac{1}{25}$ in. broad, strict and wiry, concave in front, convex on the back, grooved; margins smooth or slightly scabrid above. Inflorescence nearly dioecious or altogether so; spikelets 6–10, collected into a linear terminal spike $\frac{1}{2}$–$1\frac{1}{2}$ in. long, sessile, few-flowered, about $\frac{1}{4}$ in. long; those of the male plant with an occasional female flower or altogether unisexual, those of the female sometimes with a staminate flower at the top of the spikelets; bracts short. Glumes lanceolate, acuminate or awned, thin and membranous, pale whitish-green. Utricle narrow-lanceolate, plano-convex, nerved, winged above and tapering into a very long bidentate beak, both surfaces minutely papillose above; margins ciliate-serrate. Styles 2. Nut linear-oblong, smooth, lenticular.—*Cheesem. Man. N.Z. Fl.* (1906) 812; *Kukenth. in Pflanzenr.* Heft 38 (1909) 141. C. viridis *Petrie in Trans. N.Z. Inst.* xiii (1881) 332; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 428 (*not of Schlecht. and Cham.*).

SOUTH ISLAND: Nelson—Awatere Valley, *Cockayne;* Clarence Valley, *T. F. C.*; valley of the Stanley, *T. Kirk!* Canterbury—Mackenzie Plains, Lakes Tekapo and Pukaki, *T. F. C.* Otago—Rough Ridge, Clarke's Diggings, Carrick Range, Nevis Valley, Mount Cardrona, *Petrie!* 2000–4000 ft. December–February.

Easily distinguished by the strict whitish-green culms and leaves, almost dioecious inflorescence, and long and narrow utricles. It and *C. kaloides* are close allies of the North American and north Asiatic *C. siccata* Dewey.

8. **C. kaloides** *Petrie in Trans. N.Z. Inst.* xiii (1881) 332.—Pale-green, forming tussocks very similar to those of *Poa australis*. Culms densely tufted, slender, drooping at the tips, obtusely trigonous, grooved, smooth, leafy towards the base, 1–3 ft. high. Leaves shorter than the culms, $\frac{1}{12}$–$\frac{1}{8}$ in. broad, flat or involute, grassy, deeply grooved; margins scabrid above. Inflorescence in small specimens forming a lax linear spike 3–5 in. long; in larger ones a panicle 4–9 in.; branches few, the lowest sometimes 2 in. long. Spikelets $\frac{1}{4}$–$\frac{1}{3}$ in. long, numerous, usually rather distant, pale, few-flowered, either androgynous with the male flowers at the top, or some (usually the upper) wholly male; and others (usually the lower) wholly female; bracts very long, foliaceous, often exceeding the panicle. Glumes ovate-lanceolate, long-acuminate, membranous, pale, almost hyaline. Utricle narrow-lanceolate, narrowed at the base, plano-convex, nerved, gradually tapering upwards into a long subulate bidentate beak, the margins of which are ciliate-serrate. Styles 2. Nut dark-brown, oblong, lenticular.—*Cheesem. in Trans. N.Z. Inst.* xvi (1884) 429; *Man. N.Z. Fl.* (1906) 813; *Kukenth. in Pflanzenr.* Heft 38 (1909) 141.

SOUTH ISLAND: Not uncommon in mountain districts throughout. 800–3500 ft. December–February.

Closely allied to the preceding species, but amply distinct in the larger size and coarser habit, broader flatter leaves, and usually paniculate inflorescence.

Ant. Bot. Hann. St. (1781).

9. **C. diandra** *Schrank in Acta Acad. Mogunt.* (1782) 49. — Rhizome creeping and rooting. Culms laxly tufted, not forming dense tussocks, 1–2 ft. high, slender, wiry, triquetrous, grooved, scabrid above. Leaves shorter than the culms, $\frac{1}{20}$–$\frac{1}{12}$ in. broad, flat, grassy, deeply grooved; margins scabrid. Spikelets small, ovoid, few-flowered, androgynous; male flowers few at the top, brown or brownish-green, collected into a linear-oblong or linear dense or interrupted compound spike $\frac{3}{4}$–$1\frac{1}{4}$ in. long; bract usually obsolete. Glumes almost equalling the utricles, ovate, acute, membranous, pale-brown; margins broad, pale. Utricle rather small, shortly stipitate, ovoid, gibbous or almost cordate at the base, plano-convex or unequally biconvex, brown, shining, smooth on the flat face, more or less distinctly ribbed on the convex side, narrowed into a rather long almost winged serrate bidentate beak. Styles 2. Nut obovoid, biconvex. — *Kukenth. in Pflanzenr.* Heft 38 (1909) 175. C. teretiuscula *Good. in Trans. Linn. Soc.* ii (1794) 163; *Hook. f. Fl. Nov. Zel.* i (1853) 281; *Handb. N.Z. Fl.* (1864) 313; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 427; *Man. N.Z. Fl.* (1906) 813.

North Island: Swampy or peaty places from Lake Taupo southwards, not common. South Island: Abundant throughout. Sea-level to 3000 ft. December–March.

A common plant in the North Temperate Zone, but south of the Equator only known from New Zealand. It is easily distinguished by the slender wiry habit, usually dense spike-like panicles, small spikelets male at the top, and ovoid turgid long-beaked utricles, smooth on one side, but ribbed on the other. Better known to New Zealand and English botanists under the name of *C. teretiuscula* Good.; but Kukenthal has pointed out that Schrank's appellation of *C. diandra* has twelve years' priority.

10. **C. appressa** *R. Br. Prodr.* (1810) 242.—Very stout, harsh and rigid. Rhizome short, creeping. Culms densely tufted, 1–3 ft. high, stout, with the leaves often $\frac{1}{2}$ in. diam. at the base, rigid, grooved, acutely triquetrous with the angles sharply scabrid, leafy at the base. Leaves numerous, usually exceeding the culms, $\frac{1}{5}$–$\frac{1}{2}$ in. broad, hard, rigid, acutely keeled, grooved; keel and margins scabrid with minute recurved denticles. Spikelets small, very numerous, few-flowered, androgynous, male flowers at the top, collected in a long and narrow spike-like panicle 3–7 in. long, the primary branches erect and appressed to the rhachis; bract obsolete. Glumes broadly ovate, acute, concave, membranous, brownish with a pale line down the centre; margins not silvery. Utricle shortly stipitate, broadly ovate, plano-convex, conspicuously many-nerved on each face, contracted into a short 2-toothed beak; margins broad, incurved, conspicuously ciliate-denticulate. Styles 2. Nut elliptic-ovoid, biconvex.— *Raoul Choix* (1846) 40; *Hook. f. Fl. Antarct.* i (1844) 90; *Fl. Tasm.* ii (1860) 99; *Handb. N.Z. Fl.* (1864) 313; *Boott Ill. Car.* i (1858) 46, t. 119, 120; *Cheesem. Man. N.Z. Fl.* (1906) 814; *Kukenth. in Pflanzenr.* Heft 38 (1909) 178 (*excl. vars.*). C. paniculata *F. Muell. Veg. Chat. Is.* (1864) 57; *Benth. Fl. Austral.* vii (1878) 440 (*not of Linn.*). C. paniculata *var.* appressa *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 427.

South Island: Banks Peninsula, *A. Wall;* near Dunedin, *Petrie! Thomson!* Catlin's River, *Petrie;* Milford Sound, *Hector.* Stewart Island: Common near the sea, *Thomson! Cockayne, H. Guthrie Smith!* Chatham Islands: *H. H. Travers!* Auckland and Campbell Islands, Antipodes Island: Abundant, *Hooker, T. Kirk!* and many others.

Kukenthal unites with this species both *C. virgata* and *C. secta.* There is much to be said in favour of this, for it cannot be denied that intermediate forms exist between the three plants, and also between *C. appressa* and the northern *C. paniculata.* In

my revision of the New Zealand Carices, published in 1884, I therefore followed Baron Mueller and Mr. Bentham in placing all three under *C. paniculata*. But, as explained in the Manual, further consideration has led me to alter this opinion, and to keep the species separate. After all, the differences between the three plants are quite as well marked as those between several species of *Carex* admitted by most authors, and for the sake of consistency it appears best to uphold their distinctness. In addition to New Zealand *C. appressa* has been recorded from Queensland, New South Wales, Victoria, South Australia, West Australia, and Tasmania. Kukenthal has also identified two plants from New Caledonia with it.

11. **C. virgata** *Sol. ex Hook. f. Fl. Nov. Zel.* i (1853) 282.—Culms densely tufted, 1–3 ft. high, trigonous with the angles sharply scabrid, grooved, leafy at the base. Leaves numerous, much exceeding the culms, $\frac{1}{8}$–$\frac{1}{4}$ in. broad, harsh and rigid, grooved, sharply keeled below, flat above; margins scabrid with numerous sharp recurved denticles. Spikelets small, very numerous, few-flowered, androgynous with the male flowers at the top, arranged in a long and slender spike-like panicle 6–18 in. long; primary branches of the panicle rigid, erect, closely appressed to the rhachis, the lower usually remote and sometimes conspicuously so. Glumes almost equalling the utricles, broadly ovate, acute or acuminate, concave, membranous, brown with a narrow pale line down the centre; margins not silvery. Utricle stipitate, ovoid or triangular-ovoid, often subcordate at the base, plano-convex, conspicuously many-nerved on both faces, contracted into a short 2-toothed beak; margins incurved, conspicuously ciliate-denticulate. Styles 2. Nut broadly ovoid, biconvex.—*Boott Ill. Car.* i (1858) 46, t. 121, 122; *Hook. f. Handb. N.Z. Fl.* (1864) 313; *Cheesem. Man. N.Z. Fl.* (1906) 814. C. collata *Boott in Hook. Lond. Journ. Bot.* iii (1844) 417 (*name only*). C. paniculata *var.* virgata *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 427. C. appressa *var.* virgata *Kukenth. in Pflanzenr.* Heft 38 (1909) 179.

North and South Islands: Abundant in swamps from the Three Kings Islands to Foveaux Strait. I have seen no specimens from Stewart Island. Auckland Islands: A specimen collected by *Hombron* is referred to *C. virgata* by Kukenthal, but I am not aware of any other record. Sea-level to 3000 ft. November–January.

Very close to *C. appressa*, but the culms are more slender and not so acutely triquetrous, the leaves are narrower, and the panicle much longer and narrower, and not so dense. It also occurs in both Australia and Tasmania.

12. **C. secta** *Boott in Hook. f. Fl. Nov. Zel.* i (1853) 281.—A very large species. Rhizomes matted, often forming trunk-like masses 2–4 ft. high much resembling the stem of a tree-fern. Culms 2–4 ft., slender, inclined or drooping above, trigonous with the angles scabrid, grooved, leafy at the base. Leaves numerous, as long or longer than the culms, $\frac{1}{10}$–$\frac{1}{6}$ in. broad, grooved, keeled below, flat above; margins scabrid. Spikelets very numerous, pale-brown, small, few-flowered, androgynous with the male flowers at the top, arranged in a much and laxly branched often decompound nodding panicle 1–$2\frac{1}{2}$ ft. long; the primary divisions usually very long and slender, much branched, the spikelets often remote on the branches. Glumes almost equalling the utricles, broadly ovate, acuminate or cuspidate, thin and membranous, pale-brown with a paler line down the centre and scarious hyaline margins. Utricles rather smaller than those of *C. virgata*, shortly stipitate, broadly ovoid, turgid, plano-convex or unequally biconvex, polished and shining, quite smooth or very indistinctly nerved, contracted into a rather broad 2-toothed beak, the margins of which are ciliate-denticulate. Styles 2. Nut broadly oblong, biconvex.—*Ill.*

Car. i (1858) 47, t. 123, 124; *Cheesem. Man. N.Z. Fl.* (1906) 815. C. virgata *var.* secta *Hook. f. Handb. N.Z. Fl.* (1864) 313. C. paniculata *var.* secta *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 428. C. appressa *var.* secta *Kukenth. in Pflanzenr.* Heft 38 (1909) 179.

Var. **sectoides** *Cheesem.*—Culms stout, very rough. Inflorescence decompound; primary divisions dense, contracted, the lower shortly pedunculated. Spikelets longer. Utricles strongly convex on the back, brownish-black.—C. appressa *var.* sectoides *Kukenth. in Pflanzenr.* Heft 38 (1909) 179.

Var. **tenuicaulis** *Petrie in Trans. N.Z. Inst.* lii (1920) 19.—Culms smaller and much more slender. Leaves narrower. Inflorescence sparingly branched. Utricles barely stipitate. Probably only a reduced mountain state.

North and South Islands, Stewart Island: Abundant in swamps from the North Cape southwards. Var. *sectoides.*—Chatham Islands: *Krull, Cockayne.* Var. *tenuicaulis.*—Mountain swamps in Canterbury and Otago, *Petrie! T. F. C., A. Wall!* Chatham Islands: *W. R. B. Oliver!*

Easily distinguished from *C. virgata* by the much larger and laxly branched often decompound nodding panicles, and by the smaller utricles, which are smooth and shining or very indistinctly nerved. The immense tussocks formed by the matted rootstocks are very conspicuous objects in swampy districts, and have had the local name of "nigger-heads" applied to them.

13. **C. inversa** *R. Br. Prodr.* (1810) 242.—Rhizomes long, creeping, often matted and forming a continuous sward. Culms numerous, weak, slender, usually erect, variable in height, 4–18 in., smooth, striate, obtusely trigonous, leafy towards the base. Leaves shorter than the culms, flat or keeled, grassy, $\frac{1}{25}$–$\frac{1}{16}$ in. broad; margins usually smooth. Spikelets 2–5, crowded into a terminal cluster or spike, rarely a little remote, androgynous, pale-green, ovoid, $\frac{1}{4}$–$\frac{1}{3}$ in. long; bracts to the 2 or 3 lower ones long and leafy, far overtopping the inflorescence. Glumes ovate, acuminate or cuspidate, membranous, with a narrow green keel and pale almost hyaline margins. Male flowers at the base of the spikelets, usually few, sometimes absent. Utricle compressed, ovate, plano-convex, narrowed into a rather long beak, more or less distinctly nerved on both faces; margins serrulate above; beak 2-fid. Styles 2. Nut lenticular.—*Hook. f. Fl. Nov. Zel.* i (1853) 281; *Handb. N.Z. Fl.* (1864) 312; *Boott Ill. Car.* iv (1867) 151, t. 488; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 425; *Man. N.Z. Fl.* (1906) 816; *Kukenth. in Pflanzenr.* Heft 38 (1909) 189. C. smaragdina *Col. in Trans. N.Z. Inst.* xxvii (1895) 398.

Var. **costata** *Kukenth. in Pflanzenr.* Heft 38 (1909) 189.—Clums slender. Leaves flaccid. Utricles intense green, with stout brownish nerves on each side.

Var. **Leichardtii** *Boeck. in Linnaea,* xxxix (1875) 70.—Culms taller. Utricles conspicuously winged, abruptly narrowed into a rather long beak.—*Kukenth. l.c.* 189.

North and South Islands: From Mangonui southwards, not uncommon. Var. *costata:* Lake Wanaka, *Petrie!* Sea-level to 3000 ft. November–May.

Recognized without any difficulty by the slender grassy habit, pale spikelets male at the base, and compressed plano-convex beaked utricles. It is a common Australian plant.

14. **C. resectans** *Cheesem. in Trans. N.Z. Inst.* xxiv (1892) 413.—Forming broad depressed patches often many feet in diam. Rhizome stout, woody, creeping, much branched, clothed with the fibrous remains of the old leaf-sheaths. Culms very short, usually from $\frac{1}{2}$ to $1\frac{1}{2}$ in. high, rarely more, frequently almost wanting. Leaves few, sheathing the whole

16. C. maricata L. Sp. Pl. 974, 1753.
see Skotts. Svensk. Fledd. Göt Bot. Trad. XV p. 332.

length of the culm and much longer than it, narrow, sometimes almost filiform, involute; margins scabrid. Spikelets 2–3 or solitary, crowded into a compact head ¼ in. long, pale-green, androgynous; bracts 2–3, very long and leafy. Glumes broadly ovate, acuminate or cuspidate; margins thin, pale; keel stout, 1–3-nerved. Male flowers 1–3 at the base of the spikelet, sometimes absent; female flowers 3–8. Utricle ovate below, plano-convex, strongly nerved, narrowed upwards into a long tapering serrate deeply bifid beak. Styles 2. Nut broadly oblong, plano-convex or obscurely trigonous. — *Man. N.Z. Fl.* (1906) 816; *Kukenth. in Pflanzenr.* Heft 38 (1909) 188. C. inversa *var.* radicata *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 425.

South Island: Canterbury—Clarence Valley, Lake Tekapo, Lake Pukaki, *T. F. C.* Otago — Common in the dry upland plains of the interior, *Petrie!* 500–3000 ft. December–March.

Very close to *C. inversa*, but separated by the much smaller size and more rigid habit, wiry almost filiform leaves, short culms sheathed to the top by the leaves, and long-beaked utricles, which are very sharply toothed above. Depauperated states of *C. Kirkii* resemble it in habit, but can be distinguished by the male flowers being at the top of the spikelets.

15. **C. Colensoi** *Boott in Hook. f. Fl. Nov. Zel.* i (1853) 281, t. 63B.— Rhizome stout, woody, creeping, often much branched. Culms 3–14 in. high, very slender, almost filiform, weak, flexuous, trigonous, deeply grooved, leafy towards the base. Leaves usually shorter than the culms, but sometimes equalling or even exceeding them, narrow, $\frac{1}{30}$–$\frac{1}{20}$ in. wide at the base, wiry; margins involute. Spikelets 2–4 or solitary, compacted into a terminal cluster, androgynous, broadly ovoid, turgid, dark-brown, ¼–⅓ in. long; bracts 1 or 2, unequal. Glumes broadly ovate, acute or the lower ones cuspidate, membranous; keel narrow, green; sides chestnut-brown; margins broad, white and hyaline. Male flowers at the base of the spikelets, female flowers above. Utricle broadly ovate, plano-convex, not beaked, brown when ripe, smooth, indistinctly nerved; margins serrate above. Styles 2. Nut elliptic-oblong, smooth.—*Hook. f. Handb. N.Z. Fl.* (1864) 312; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 425; *Man. N.Z. Fl.* (1906) 817; *Kukenth. in Pflanzenr.* Heft 38 (1909) 189. C. picta *Col. in Trans. N.Z. Inst.* xxi (1889) 103. not (St. Vincent).

North and South Islands: Not uncommon in hilly districts from the Upper Thames southwards. Sea-level to 4500 ft. November–March.

Also in south-eastern Australia, according to Mr. C. B. Clarke.

C. maricata L. Sp. Pl. 1753: 974.

16. **C. stellulata** *Good. in Trans. Linn. Soc.* ii (1794) 144. — Culms more or less densely tufted, slender, trigonous, leafy at the base, 4–18 in. high. Leaves usually shorter than the culms, flat, grassy, grooved, $\frac{1}{25}$–$\frac{1}{15}$ in. broad; margins scabrid. Spikelets 3–5, approximate in a terminal spike or a little remote, sessile, androgynous, green or pale-brown, about ¼ in. long when mature; lowest bract short, subulate. Glumes ovate, acute or obtuse, membranous, pale-brown or green with a dark-green centre. Male flowers at the base of the spikelets, usually few; females more numerous. Utricle yellowish-green, much longer than its glume, spreading when ripe, giving the spikelet a squarrose appearance, ovate-lanceolate from a rounded and spongy base, plano-convex, many-nerved, narrowed above into a bidentate beak; margins of the beak acute, minutely scabrid, or nearly smooth in most of the New Zealand

17. C. bipartita
17. C. lacheualii

specimens. Styles 3. Nut lenticular.—*Hook. f. Fl. Nov. Zel.* i (1853) 281; *Handb. N.Z. Fl.* (1864) 312; *Kukenth. in Pflanzenr.* Heft 38 (1909) 225. C. echinata *Boeck. in Linnaea,* xxxix (1875) 124; *Benth. Fl. Austral.* vii (1878) 439; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 426; *Man. N.Z. Fl.* (1906) 817.

Var. **australis** *Kukenth. l.c.* 230.—Culms and leaves flaccid. Utricles with the margins smooth or scarcely scabrid.—C. debilis *T. Kirk in Trans. N.Z. Inst.* x (1878) 412 (*name only*).

North and South Islands, Stewart Island: Marshy places from the Upper Thames Valley southwards, not uncommon. Sea-level to 4000 ft. November–March.

Widely distributed in the temperate portions of the Northern Hemisphere, but only known from Australia and New Zealand in the Southern. In the first edition of this work I followed Bentham and other well-known writers in adopting the name of *C. echinata* Murr. for this species. But the late Mr. C. B. Clarke definitely proved that Murray's plant was identical with the northern *C. muricata,* and Kukenthal has arrived at the same conclusion. Under these circumstances botanists are pretty well agreed in taking up the next-oldest name of *C. stellulata* Good. The plant found in New Zealand is treated by Kukenthal as an endemic variety.

17. **C. lagopina** *Wahl. in Vet. Akad. Nya Handl. Stockh.* (1803) 145.—Culms densely tufted, short, wiry, smooth or scabrid above, leafy at the base, 2–8 in. high. Leaves shorter than the culms, flat, grassy, grooved, $\frac{1}{20}$–$\frac{1}{10}$ in. broad; margins smooth or nearly so. Spikelets 2–4, rarely more, approximate in a short terminal spike about $\frac{1}{2}$ in. long, sessile, androgynous, red-brown, about $\frac{1}{5}$ in. long; lowest bract short, not exceeding its spikelet. Glumes broadly ovate, obtuse or subacute, membranous, red-brown with a green midrib and pale hyaline margins. Male flowers at the base of the spikelets, females above. Utricle rather longer than its glume, red-brown, elliptic-ovate, plano-convex, not winged, faintly nerved, rather abruptly narrowed into a short slender beak. Styles 2. Nut broad, lenticular.—*T. Kirk in Trans. N.Z. Inst.* xxvi (1894) 262; *Petrie in Trans. N.Z. Inst.* xxviii (1896) 593; *Cheesem. Man. N.Z. Fl.* (1906) 818; *Kukenth. in Pflanzenr.* Heft 38 (1909) 213. C. Parkeri *Petrie in Trans. N.Z. Inst.* xiii (1881) 332; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 426.

South Island: Nelson—Dun Mountain Range, *H. H. Travers!* Canterbury—Craigieburn Mountains, *Petrie!* Otago—Hector Mountains, Mount Arnould, near Mount Aspiring, mountains at the head of Lake Wakatipu, *Petrie!* Mount Cardrona, *A. Wall.* 4000–6000 ft. January–March.

Also found in arctic and alpine Europe, north Asia, and North America, but only known from New Zealand in the Southern Hemisphere. Easily distinguished from *C. leporina,* to which it is allied, by the much smaller size and rounder wingless utricles. Certainly indigenous.

18. **C. leporina** *Linn. Sp. Plant.* (1753) 973.—Culms laxly tufted, stout or rather slender, trigonous, scabrid above, 6–18 in. high. Leaves shorter than the culms, flat, grassy, striate, $\frac{1}{10}$–$\frac{1}{8}$ in. broad; margins minutely scabrid. Spikelets 4–6, crowned in an oblong lobed spike $\frac{3}{4}$–1 in. long, sessile, androgynous, ovoid, brownish-green, shining, about $\frac{1}{3}$ in. long; lowest bract like the glumes or rarely with a short leafy point. Glumes oblong-ovate or oblong-lanceolate, acute or subacute, pale-brown with a green midrib and hyaline margins. Male flowers at the base of the spikelets, female above. Utricle equalling its glume, elliptic-ovoid, plano-

convex, winged, striate, narrowed into a long beak; margins and beak finely serrulate. Styles 2. Nut oblong, lenticular, shining.—*Cheesem. in Trans. N.Z. Inst.* xiv (1882) 301; *Man. N.Z. Fl.* (1906) 818; *Kukenth. in Pflanzenr.* Heft 38 (1909) 210.

North Island: Auckland—Near Mauku, *H. Carse!* Waihi, *H. B. Devereux!* Wellington—Ohariu Valley, *T. Kirk!* South Island: Nelson—Picton, *J. H. Macmahon!* not uncommon in the western portion of the district, ascending to 4000 ft. on the Mount Arthur Plateau, *T. F. C.;* near Westport, *W. Townson!* November–January.

A common plant in northern Europe, north Asia, and some parts of North America. It is probably introduced into New Zealand.

19. **C. Gaudichaudiana** *Kunth Enum.* ii (1837) 417.—Rhizome stoloniferous. Culms slender, strict, trigonous, smooth or slightly scabrid above, very variable in height, usually from 4 to 12 in., but sometimes dwarfed to 1 or 2 in., at other times attaining 18 in. Leaves shorter or longer than the culms, narrow, flat, grassy, $\frac{1}{20}$–$\frac{1}{12}$ in. broad. Spikelets 3–5, rarely more or fewer, sessile or the lowest very shortly stalked, erect, close together or a little remote, $\frac{1}{4}$–$\frac{3}{4}$ in. long; terminal one (and sometimes a smaller one near its base) wholly male, linear or linear-oblong; the rest female, often with a few male flowers at the top, oblong, cylindric; bracts long and leafy, the lowest usually exceeding the inflorescence. Glumes oblong or obovate-oblong, obtuse or very shortly mucronate, shorter than the utricle, dark-purple or purplish-black, usually with a narrow pale midrib and margins. Utricle narrow-ovate to orbicular-ovate, much compressed, conspicuously nerved almost to the apex, green spotted with brownish-red when ripe, upper portion minutely granular-papillose; beak very short, almost wanting, entire or minutely 2-toothed. Styles 2. Nut broadly ovate, plano-convex.—*Hook. f. Fl. Tasm.* ii (1860) 99, t. 151A; *Handb. N.Z. Fl.* (1864) 313; *Cheesem. Man. N.Z. Fl.* (1906) 818; *Kukenth. in Pflanzenr.* Heft 38 (1909) 312. C. vulgaris *var.* Gaudichaudiana *Boott Ill. Car.* iv (1867) 169, t. 567; *Benth. Fl. Austral.* vii (1878) 442; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 429. C. caespitosa *R. Br. Prodr.* (1810) 242 (*not of Good.*).

Var. **humilior** *Kukenth. l.c.* 313.—Culms shorter, often curved. Spikelets all approximate, short, oblong-ovate. Utricles broader, ovate.

North and South Islands: Moist places in mountain districts from the Upper Waikato southwards, rarer in the lowlands. Sea-level to 4500 ft. November–February. Var. *humilior:* Not uncommon on the mountains of Nelson, Canterbury, and Otago, *T. F. C., Cockayne! Petrie!*

Also in Australia and Tasmania, and very closely allied to the almost cosmopolitan *C. vulgaris* Fries, differing chiefly in the more compressed and conspicuously nerved utricles.

20. **C. subdola** *Boott in Trans. Linn. Soc.* xx (1846) 142.—Rhizome creeping, stoloniferous. Culms slender, trigonous, slightly scabrid above, 1–2 ft. high. Leaves usually exceeding the culms, pale-green, soft, grassy, $\frac{1}{12}$–$\frac{1}{8}$ in. broad; margins scabrid above. Spikelets 4–8, erect, 1–3 in. long; terminal 1–3 male, usually approximate, sessile, very slender, cylindric; the remainder female, usually with a few male flowers at the top, the upper sometimes geminate, sessile or shortly stalked, the lower solitary, often remote, on longer peduncles; bracts very long and leafy, far exceeding the inflorescence. Glumes

17. C. bipartita
17. C. lachenalii

specimens. Styles 3. Nut lenticular.—*Hook. f. Fl. Nov. Zel.* i (1853) 281; *Handb. N.Z. Fl.* (1864) 312; *Kukenth. in Pflanzenr.* Heft 38 (1909) 225. C. echinata *Boeck. in Linnaea*, xxxix (1875) 124; *Benth. Fl. Austral.* vii (1878) 439; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 426; *Man. N.Z. Fl.* (1906) 817.

Var. **australis** *Kukenth. l.c.* 230.—Culms and leaves flaccid. Utricles with the margins smooth or scarcely scabrid.—C. debilis *T. Kirk in Trans. N.Z. Inst.* x (1878) 412 (*name only*).

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Carex leporina, Linn.

not native to N.Z. see T.N.Z.I.

vol. 57, p. 62. (Ckn. & Allan).

convex, winged, striate, narrowed into a long beak; margins and beak finely serrulate. Styles 2. Nut oblong, lenticular, shining.—*Cheesem. in Trans. N.Z. Inst.* xiv (1882) 301; *Man. N.Z. Fl.* (1906) 818; *Kukenth. in Pflanzenr.* Heft 38 (1909) 210.

North Island: Auckland—Near Mauku, *H. Carse!* Waihi, *H. B. Devereux!* Wellington—Ohariu Valley, *T. Kirk!* South Island: Nelson—Picton, *J. H. Macmahon!* not uncommon in the western portion of the district, ascending to 4000 ft. on the Mount Arthur Plateau, *T. F. C.;* near Westport, *W. Townson!* November–January.

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of the emargination, dark red-brown or purplish-brown usually with a green stripe down the centre. Utricle ovate, much compressed, conspicuously nerved, green or brownish-green, narrowed into a very short entire or minutely 2-toothed beak. Styles 2. Nut broadly ovate, planoconvex.—*Hook. f. Fl. Nov. Zel.* i (1853) 282; *Handb. N.Z. Fl.* (1864) 314; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 430; *Man. N.Z. Fl.* (1906) 819; *Kukenth. in Pflanzenr.* Heft 38 (1909) 366.

North and South Islands: Abundant in swamps from the North Cape to Nelson, North Canterbury, and Westport. Sea-level to 2000 ft. November–January.

Chiefly distinguishable from *C. Gaudichaudiana* by the larger size, more numerous and much longer often stalked spikelets, and by the awn to the glume, although the last is a variable character. Mr. C. B. Clarke considered it to be a variety of *C. Gaudichaudiana*, an opinion with which I cannot agree.

21. **C. Darwinii** *Boott in Proc. Linn. Soc.* i (1845) 261.—Rhizome thick, creeping, stoloniferous. Culms 1–3 ft. high, stout below, slender and drooping above, sharply triquetrous, faces concave. Leaves numerous, equalling or longer than the culms, $\frac{1}{5}$–$\frac{2}{5}$ in. broad, margins and midrib sharply scabrid; bracts leafy, the lower far exceeding the culms. Spikelets numerous, 6–15, dark ferruginous-brown, distant, long-stalked, pendulous, $\frac{1}{2}$–3 in. long; upper 1–3 male, solitary or the lower geminate; the remainder female but often with a few male flowers at the top, geminate or ternate, lax-flowered at the base. Glumes lanceolate or ovate-lanceolate, dark-brown with a pale keel, 1–3-nerved, cuspidate. Utricle ovate, planoconvex, 3–5-nerved on each face, minutely papillose-granulate and more or less spotted with purple, narrowed into a very short beak with an almost entire mouth. Styles 2. Nut broadly obovoid.—*Hook. f. Fl. Antarct.* ii (1847) 364, t. 145; *Boott Ill. Car.* iv (1867) 156, t. 504–5; *Cheesem. Man. N.Z. Fl.* (1906) 1154; *Kukenth. in Pflanzenr.* Heft 38 (1909) 367.

Var. **urolepis** *Kukenth. l.c.*—Glumes of the female flowers long-awned, much exceeding the utricles.—C. urolepis *Franch. in Miss. Sc. Cape Horn*, v (1889) 376, t. 5.

Chatham Islands: Lowland swamps, *Cockayne! W. R. B. Oliver!* Auckland Islands: *Chapman!* Antipodes Island: *B. C. Aston!*

Also in South America, where it stretches from Chile to the Strait of Magellan and Fuegia. All the specimens hitherto found in New Zealand fall under var. *urolepis*. As a species *C. Darwinii* comes nearer to *C. ternaria* than to any other New Zealand species, principally differing in the utricle and glumes.

22. **C. ternaria** *Forst. f. Prodr.* (1786) n. 549.—Usually very tall and stout. Rhizome thick, stoloniferous. Culms robust, $1\frac{1}{2}$–4 ft. high, triquetrous with the angles very sharply scabrid, faces grooved and striate. Leaves numerous, equalling or exceeding the culms, broad, flat, grassy, grooved, $\frac{1}{5}$–$\frac{1}{2}$ in. broad; margins and midrib beneath sharply scabrid; sheathing scales at the base of the leaves with the margins transversely fibrillose. Spikelets numerous, 8–24, dark-brown, stout, long-stalked, pendulous, 1–4 in. long; upper 1–6 male, solitary or the lower geminate; the remainder female, usually with male flowers at the top, geminate or ternate or even quinate, the lowest on very long peduncles; bracts very long and leafy, overtopping the inflorescence. Glumes lanceolate to oblong-lanceolate or oblong-ovate, obtuse or retuse at the tip, with a stout hispid awn of very variable length but usually exceeding the utricles, dark-brown with a green keel. Utricle ovate, biconvex, turgid, nerved, brownish, narrowed into a very short beak with an entire mouth. Styles 2. Nut

broadly oblong.—*Raoul Choix* (1846) 40; *Hook. f. Fl. Antarct.* i (1844) 89; *Fl. Nov. Zel.* i (1853) 282; *Handb. N.Z. Fl.* (1864) 314; *Boott Ill. Car.* iv (1867) 176, t. 596; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 431; *Man. N.Z. Fl.* (1906) 820; *Kukenth. in Pflanzenr.* Heft 38 (1909) 369. C. geminata *Schkuhr Riedgr.* i (1801) 65; *A. Cunn. Precur.* (1836) n. 290. C. polystachya *A. Rich. Fl. Nouv. Zel.* (1832) 118, t. 21.

Var. **gracilis** *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 431.—Tall, slender. Leaves usually narrower, $\frac{1}{8}$–$\frac{1}{5}$ in. broad. Spikelets numerous, long, often over 4 in., slender, sometimes barely $\frac{1}{6}$ in. diam.

Var. **pallida** *Cheesem. l.c.* — Stout. Leaves strict, rigid, often coriaceous. Spikelets fewer, short, pale, on long filiform peduncles. Utricles broader and more turgid, indistinctly nerved, sometimes with serrate margins.

North and South Islands, Stewart Island, Auckland Islands, Antipodes Island: The typical form and var. *gracilis* abundant throughout, var. *pallida* not uncommon in the mountains of the South Island. Sea-level to 4000 ft. November–February.

Very distinct in its ordinary state, but small slender forms appear to run into *C. subdola* and into the following species. I do not consider that my var. *pallida* can be possibly included in *Boott's* var. *minor*, as has been done by Kukenthal. The late Mr. C. B. Clarke agreed with me in treating var. *minor* as a depauperated state of the type, and he was well acquainted with it.

23. **C. Sinclairii** *Boott MS. in Herb. Kew.*—Rhizome creeping, stoloniferous. Culms slender or rather stout, triquetrous, scabrid above, 6–18 in. high. Leaves shorter or longer than the culms, flat, grassy, striate, $\frac{1}{15}$–$\frac{1}{8}$ in. broad; margins scabrid; sheaths at the base not transversely fibrillose. Spikelets 4–6, erect or nearly so, short, stalked or the uppermost sessile, $\frac{1}{2}$–$1\frac{1}{2}$ in. long; terminal 1 or 2 male, very slender; remainder female, usually with a few male flowers at the top, solitary or the upper geminate, rarely compound at the base, the lower usually on longer peduncles. Glumes oblong or oblong-ovate, tapering upwards, acute or obtuse, not mucronate or the mucro very short and inconspicuous, dark red-brown, unicolorous or with a very narrow pale stripe down the centre. Utricle equalling the glume or barely exceeding it, ovate, much compressed, nerved, narrowed into a short minutely 2-toothed beak. Styles 2. Nut broadly oblong, lenticular.—*Cheesem. Man. N.Z. Fl.* (1906) 820.

South Island: Nelson—Mount Arthur Plateau, Wairau Valley, Hanmer Plains, *T. F. C.* Canterbury—*Sinclair* and *Haast*, n. 138 *in Herb. Kew*; Broken River, Lake Tekapo, *T. F. C.* Westland—Okarito, *A. Hamilton!* Otago—*Hector* and *Buchanan*, *Petrie!* 1000–3000 ft. December–February.

I am indebted to Mr. C. B. Clarke for supplying me with information respecting this, and for identifying some of my specimens. It appears to be a somewhat critical species, differing from depauperated states of *C. ternaria* in the basal leaf-sheaths not being transversely fibrillose, in the much fewer erect spikelets, and barely awned glumes, &c. From *C. Gaudichaudiana*, large states of which approach it in habit, it is removed by the broader harsher leaves, the spikelets often stalked and geminate, the longer glumes not rounded at the tip, and by the utricle not being granular-papillose. I suspect that in the South Island mountain states have been confused with *C. subdola*.

24. **C. Raoulii** *Boott in Hook. f. Fl. Nov. Zel.* i (1853) 283.—Yellowish-green or dark-green, laxly tufted, often spreading at the base. Culms rather stout, triquetrous, scabrid on the angles, 9–18 in. high. Leaves longer than the culms, flat, broad, coriaceous, grooved, $\frac{1}{6}$–$\frac{1}{4}$ in. broad, scabrid on the margins and midrib beneath. Spikelets 4–8, all female but usually with a few male flowers below, the uppermost generally with more male

C. haastii Boeck. Flora 1878 166.
C. raoulii Boott Icones haastianae
C. haastii Boeckel Fl. 1882 59. (Boeck.) Kük

flowers below, stout, erect, all approximate and sessile, or less crowded with the lowest one remote and pedunculate, green or greenish-brown, ½–1 in. long, ¼ in. broad; bracts long and leafy. Glumes broadly ovate, thin and membranous, pale-brown, bifid; midrib stout, produced into a short or long hispid awn. Utricle broader and longer than the glumes, elliptic, unequally biconvex, strongly nerved, narrowed into a stout 2-toothed beak; margins serrate above or almost even. Styles 2. Nut broadly oblong, lenticular.—*Hook. f. Handb. N.Z. Fl.* (1864) 314; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 433; *Man. N.Z. Fl.* (1906) 821; *Kukenth. in Pflanzenr.* Heft 38 (1909) 687; *Cheesem. Ill. N.Z. Fl.* ii (1914) t. 215.

South Island: Nelson—Graham River, Wangapeka River, Mount Owen, Jollie's Pass, *T. F. C.*; Fowler's Pass, *T. Kirk!* Lake Tennyson, *R. M. Laing.* Marlborough—Mount Fyffe, *T. Kirk!* Canterbury—Akaroa, *Raoul*; Southern Alps, *Sinclair* and *Haast*; Mount Torlesse, *T. Kirk!* Kowai River, *Cockayne!* Broken River, Upper Waimakariri, Lake Tekapo, Hooker Valley, *T. F. C.* Otago—Lake Wakatipu, Lake Wanaka, Mount Ida, *Buchanan! Petrie!* Bluff Hill, *Cockayne.* 200–4000 ft. December–February.

A distinct species, easily recognized by the broad flat leaves, by the terminal spikelet being always partly female, and by the strongly nerved elliptic utricles, usually serrate above. Mr. Clarke informs me that all Raoul's specimens at Kew have the utricles hairy on the upper half, but I have seen no specimens showing this peculiarity.

25. **C. dipsacea** *Berggr. in Minneskr. Fisiog. Sallsk. Lund.* (1877) 28, t. 7, f. 8–14.—Densely tufted. Culms slender, smooth, erect, leafy, 1–2 ft. high, scarcely elongating in fruit. Leaves numerous, longer than the culms, rather narrow, $\frac{1}{12}$–$\frac{1}{8}$ in. broad, flat, keeled, striate; margins and keel sharply scabrid. Spikelets 4–7, close together except the lowest, which is usually remote, dense-flowered, pale or dark-brown; terminal one male, slender, sometimes mixed with female flowers; remainder female, but often with a few male flowers below, short and broad, ½–1 in. long, sessile or the two lower shortly pedunculate; bracts long and leafy, far overtopping the inflorescence. Glumes rather shorter than the utricles, orbicular-ovate, obtuse, membranous, pale or dark chestnut-brown, midrib vanishing at the apex or shortly excurrent; margins scarious, pale. Utricles densely packed, spreading when ripe, elliptic-ovoid, unequally biconvex or almost plano-convex, smooth, nerveless; margins sharply and distantly serrate above; beak short, 2-toothed. Styles 2. Nut obovoid-oblong, lenticular.—*Cheesem. in Trans. N.Z. Inst.* xvi (1884) 432; *Man. N.Z. Fl.* (1906) 822; *Kukenth. in Pflanzenr.* Heft 38 (1909) 686.

North and South Islands: From the Lower Waikato to Foveaux Strait, not uncommon. Sea-level to 3000 ft. November–January.

Very close to *C. testacea*, but usually recognized without difficulty by the densely packed utricles, spreading on all sides when ripe.

26. **C. testacea** *Sol. ex Boott in Hook. f. Fl. Nov. Zel.* i (1853) 282.—Laxly tufted. Culms very slender, sometimes filiform, smooth or slightly scabrid above, 6–18 in. high, in some varieties elongating in fruit and becoming prostrate, occasionally reaching a length of 4–5 ft. Leaves longer or shorter than the culms, $\frac{1}{15}$–$\frac{1}{8}$ in. broad, flat, usually keeled, striate; margins harsh and scabrid. Spikelets 3–5, approximate, pale-brown; terminal one male, slender; remainder all female, sometimes with a few male flowers below, rarely above, short and broad, ½–1 in. long, ¼–⅓ in. broad, sessile or the lowest shortly peduncled; bracts long and leafy, far overtopping the inflorescence. Glumes broadly ovate, thin and membranous, deeply emarginate or bifid, with a long or short awn from

the centre of the emargination, pale-brown streaked with chestnut, median portion more or less conspicuously 3-nerved. Utricles equalling the glumes or shorter than them, broadly ovate, plano-convex or nearly so, 7–11-nerved on the convex face, polished and shining, purplish at the apex, paler below, or wholly pale-brown; margins more or less distinctly serrate above, rarely even; beak short, with 2 widely divergent teeth. Styles 2. Nut obovoid-oblong, lenticular.—*Hook. f. Handb. N.Z. Fl.* (1864) 314 (*in part*); *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 444; *Man. N.Z. Fl.* (1906) 822; *Kukenth. in Pflanzenr.* Heft 38 (1909) 687.

North and South Islands, Stewart Island: Abundant throughout. Sea-level to 3500 ft. October–January.

The best marks of this variable plant are the comparatively lax habit, very slender culms which often elongate in fruit and become prostrate, usually aggregated spikelets, and plano-convex utricles with nerved faces and serrate margins.

27. **C. Wakatipu** *Petrie in Trans. N.Z. Inst.* xiv (1882) 363.—Laxly tufted, often spreading at the base. Culms short, rather stout, trigonous, smooth, very variable in size, usually 4–8 in. high, but sometimes elongated to 12 or 14 in., and alpine specimens are often dwarfed to 1–2 in. Leaves always much longer than the culms, frequently twice the length, broad, flat, grooved, $\frac{1}{8}$–$\frac{1}{5}$ in. diam.; margins slightly scabrid. Spikelets 3–6, closely packed, pale- or dark-brown; terminal one (rarely two) male, slender; remainder all female, sometimes with a few male flowers below or rarely above, sessile or the lowest shortly pedunculate, $\frac{1}{3}$–1 in. long; bracts very long and leafy, far overtopping the spikelets. Glumes broadly ovate, thin and membranous, bifid, pale-chestnut, sometimes dark-brown; midrib stout, ending in a short awn. Utricle broadly elliptic-ovoid, unequally biconvex, strongly 7–11-nerved, pale-brown to dark-brown; margins usually smooth; beak short, 2-toothed. Styles 2. Nut broadly oblong, lenticular.—*Cheesem. in Trans. N.Z. Inst.* xvi (1884) 434; *Man. N.Z. Fl.* (1906) 823; *Kukenth. in Pflanzenr.* Heft 38 (1909) 687.

South Island: Not uncommon in alpine and subalpine localities throughout. 2500–5500 ft. December-February.

Distinguished from *C. testacea* by the smaller size and more robust habit, broader leaves always much exceeding the culms, closely aggregated spikelets, and more turgid strongly nerved utricles.

28. **C. devia** *Cheesem. in Trans. N.Z. Inst.* xv (1883) 301.—Culms laxly tufted, smooth or nearly so, leafy at the base, 6–18 in. high. Leaves shorter than the culms, spreading, rigid and coriaceous, flat or involute, strongly grooved, $\frac{1}{10}$–$\frac{1}{6}$ in. diam.; margins scabrid. Spikelets 2–4, approximate or the lowest alone remote, dark-brown; terminal one the largest, male, rarely with a few female flowers at the base, rather stout, sometimes almost clavate, $\frac{3}{4}$–$1\frac{1}{2}$ in. long; remainder all female, erect, oblong, $\frac{1}{2}$–1 in. long, sessile or the lowest very shortly pedunculate; lowest bract long and leafy, the rest small. Glumes dark-brown with a pale centre, ovate, acute, emarginate or shortly bifid, the midrib produced into a hispid awn of varying length. Utricle equalling the glumes or rather longer than them, elliptic-ovoid, unequally biconvex or almost plano-convex, strongly nerved on both faces, purplish-black; margins entire; beak short, bifid. Styles 2. Nut broadly obovoid-oblong, compressed.—*Trans. N.Z. Inst.* xvi (1884) 433; *Man. N.Z. Fl.* (1906) 823; *Kukenth. in Pflanzenr.* Heft 38 (1909) 686.

C. coxiana Petrie, C. Mantkini Petrie C. Mcburgii Pet.
C. nekohn P. C. rotoensis P. all Chatham Is.
Trans. 56: 1926: 6-9

SOUTH ISLAND: Nelson—Mount Arthur Plateau, St. Arnaud Mountains, Raglan Range, *T. F. C.*; Dun Mountain, *H. H. Travers!* D'Urville Island, *H. B. Kirk!* 1000–3000 ft. December–January.

Mr. C. B. Clarke considered this to be a variety of *C. lucida*, to which it approaches very closely in the glumes and utricle. But the habit is altogether different, being nearer to some states of *C. testacea*, the leaves are shorter and broader and more coriaceous, the spikelets are fewer in number and shorter and broader, the terminal male one being often clavate, and the utricles are conspicuously nerved on both faces.

29. **C. lucida** *Boott in Hook. f. Fl. Nov. Zel.* i (1853) 283.—Densely tufted, usually forming large tussocks. Culms very slender, leafy, smooth or slightly scabrid above, in the flowering stage 12–24 in. high and usually overtopped by the leaves, in fruit often but not invariably elongating and becoming prostrate, sometimes reaching a length of 4 or 5 ft. or even more. Leaves numerous, spreading or drooping at the tips, narrow, $\frac{1}{15}$–$\frac{1}{8}$ in. broad, keeled; margins and keel sharply scabrid. Spikelets 4–8, narrow, erect, cylindric, $\frac{1}{2}$–2 in. long, pale-brown to dark-brown; upper 1–3 male, very slender, unequal in length, close together; remainder female but occasionally with a few male flowers below or rarely at the top, almost sessile or on peduncles of varying length, usually rather distant, the lowermost often remote and occasionally compound at the base; bracts very long and leafy. Glumes broadly ovate, acute or obtuse, rarely very shortly emarginate, cuspidate with a short hispid awn, pale or dark chestnut-brown with a pale keel. Utricle about as long as the glume, elliptic-ovoid, unequally biconvex, smooth or obscurely nerved on the rounded face, shining, from purplish-black to pale-brown; margins smooth; beak short, acutely bidentate. Styles 2. Nut broadly oblong, biconvex. — *Hook. f. Handb. N.Z. Fl.* (1864) 314; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 314; *Man.* 432 *N.Z. Fl.* (1906) 824; *Kukenth. in Pflanzenr.* Heft 38 (1909) 686. C. flagellifera *Col. in Trans. N.Z. Inst.* xvi (1884) 342.

KERMADEC ISLANDS: *W. R. B. Oliver!* NORTH AND SOUTH ISLANDS, STEWART ISLAND: From the North Cape southwards, abundant. Sea-level to 3000 ft. October–January.

A well-known species, easily distinguished by the slender culms, narrow keeled leaves, distant long and narrow spikelets, usually entire glumes, and turgid smooth and polished utricles.

30. **C. Buchanani** *Berggr. in Journ. Bot.* xviii (1880) 104. — Densely tufted, usually reddish-purple, rarely whitish-green. Culms closely packed, slender, strict, erect, 1–2 ft. high, quite smooth. Leaves equalling the culms or longer than them, narrow, strict, semiterete, grooved on the convex face, $\frac{1}{20}$–$\frac{1}{12}$ in. broad; margins scabrid. Spikelets 4–6, linear-oblong, erect, cylindric, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, remote or the upper approximate, pale whitish-green; terminal 1 or rarely 2 male, very slender; remainder female, usually with a few male flowers below, sessile or the lowest shortly pedunculate; bracts long and leafy. Glumes longer than the utricles, broadly ovate with a long hispid awn, pale, membranous; margins lacerate. Utricle elliptic, plano-convex, smooth or faintly nerved on the convex face, spotted with dark-purple; margins ciliate-serrate above; beak rather long, deeply bifid. Styles 2. Nut obovoid-oblong, plano-convex.—*Trans. N.Z. Inst.* xiii (1881) 290; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 431; *Man. N.Z. Fl.* (1906) 825. C. lucida *var.* Buchanani *Kukenth. in Pflanzenr.* Heft 38 (1909) 686. C. tenax *Berggr. in Minneskr. Fisiog. Sallsk. Lund.* (1877) 27, t. 7, t. 1–7 (*not of Chapm.*).

C. McMahoni Petrie Trans 56: 1926: 6. Petrels Valley

Foxton.

South Island: Abundant in hilly and mountainous districts throughout. Sea-level to 3500 ft. December–January. Sea Wall Red. Count 11. 4. 1936 110.

The chief characters of this species are the strict erect habit, semiterete leaves, pale-coloured glumes, and elliptic plano-convex utricles, the margins of which are serrate above. The reddish-purple colour, which is often constant through large districts, is also seen in *C. comans*, *C. Petriei*, *C. uncifolia*, and others. It probably occurs in the mountainous centre of the North Island, but I have seen no specimens from thence. Kukenthal reduces it to *C. lucida* as var. *Buchanani*, a view with which I am unable to concur. *C. Buchanani* differs markedly in the much more strict and erect habit, in the semiterete and much more coriaceous leaves, in the pale-coloured glumes, and in the plano-convex utricles, which are sharply serrate above, and have a much longer and more deeply bidentate beak. Not only is the aspect of the plant most distinct, so that it can be recognized at a glance, but its characters appear to me to be fairly constant. Dr. Kukenthal remarks that it is connected with *C. lucida* by numerous passage forms; but I have not myself met with specimens that could be so described. I feel sure that all New Zealand botanists familiar with the plant will repudiate any proposal to associate it with *C. lucida*.

31. **C. cirrhosa** *Berggr. in Minneskr. Fisiog. Sallsk. Lund.* (1877) 29, t. 7, f. 27–34.—A dwarf species forming compact glaucous-green or reddish tufts. Culms very short, densely packed, 1–1½ in. high, leafy throughout. Leaves longer than the culms, narrow, flat or almost plano-convex, grooved; tips obtuse, curled and twisted when dry; margins scabrid. Spikelets 4–5, approximate and almost concealed by the leaves, ⅙–⅓ in. long; terminal one male, slender; remainder all female, with or without a few male flowers below, all sessile or the lowest very shortly peduncled; bracts leafy, far exceeding the spikelets. Glumes ovate-lanceolate, entire, cuspidate, whitish-green with a darker midrib. Utricle about equalling the glumes, elliptic-ovoid, plano-convex, nerved, pale, narrowed into a rather long acutely bidentate beak; margins entire or minutely denticulate. Styles 2. Nut lenticular.—*Cheesem. in. Trans N.Z. Inst.* xvi (1884) 435; *Man. N.Z. Fl.* (1906) 825; *Kukenth. in Pflanzenr.* Heft 38 (1909) 683.

Var. **lutescens** *Kukenth. in Cheesem. Man. N.Z. Fl.* (1906) 825. — Culms taller, 2–4 in. high. Spikelets longer and further apart, the lowest one sometimes remote. Utricle narrow-elliptic; beak longer.

South Island: Canterbury—Upper Waimakariri and Lake Lyndon, *Berggren! J. D. Enys! T. Kirk! Cockayne, T. F. C.* December–February.

A very peculiar little plant. 76 (1917) 585

32. **C. Berggreni** *Petrie in Trans. N.Z. Inst.* xviii (1886) 297.—Small, reddish-brown or green, forming broad depressed tufts. Culms branched at the base, very short, stout, spreading, sheathed to the top by the leaves, ½–1½ in. high. Leaves spreading, exceeding the culms, 1–2 in. long, $\frac{1}{20}$–$\frac{1}{12}$ in. broad, linear, quite flat, obtuse, deeply striate, coriaceous; margins smooth or serrate above. Spikelets 2–3, small, ⅙–¼ in. long, usually approximate, all shortly peduncled or almost sessile, red-brown; terminal one male; the remainder female; bracts short, broad. Glumes broadly ovate, obtuse or very shortly cuspidate, membranous, chestnut-brown, usually with a green midrib and paler margins. Utricles rather longer than the glumes, elliptic, biconvex or obscurely trigonous, indistinctly nerved, dark red-brown or almost black above, paler towards the base; margins smooth; beak almost wanting, minutely bifid. Styles 2 or 3. Nut acutely trigonous.—*Cheesem. Man. N.Z. Fl.* (1906) 826; *Kukenth. in Pflanzenr.* Heft 38 (1909) 685, t. 117.

South Island: Canterbury—Upper Waimakariri, *Petrie;* Arthur's Pass, *W. Martin;* margins of lagoons near the Cass River, Lake Tekapo, *T. F. C.* Otago—Mount Pisa, Old Man Range, Mount Kyeburn, *Petrie!* 2500–5000 ft. December–February. Broken R. Basin 7 x 2

One of the most distinct species of the genus. The linear flat leaves, of uniform width throughout, and very obtuse at the tip, are unmistakable. The styles are sometimes 2, sometimes 3, but the acutely trigonous nut shows that the alliance of the species is with the 3-styled division of the genus. My Cass River specimens have narrower leaves and more closely compacted spikelets, and are placed by Kukenthal as var. *angustifolia*.

33. **C. Hectori** *Petrie in Trans. N.Z. Inst.* xxvii (1895) 405.—Culms densely tufted, branched at the base, erect, leafy throughout; 1–3 in. high. Leaves exceeding the culms, green, erect, rigid, flat, striate, about $\frac{1}{20}$ in. broad; tips subacute; margins scabrid above. Spikelets 3–4, closely approximate, small, $\frac{1}{6}$–$\frac{1}{4}$ in. long, red-brown; terminal one male, erect; remainder all female, spreading, ovoid-oblong, sessile or the lowest very shortly pedunculate; bracts long, leafy, overtopping the spikelets. Glumes ovate, acuminate or cuspidate with the stout excurrent midrib, membranous, chestnut-brown with a paler midrib and margins. Utricles narrow-ovoid, trigonous, strongly nerved, narrowed at the base and upwards into an acutely 2-toothed beak; margins ciliate-serrate above. Styles 3. Nut trigonous.—*Cheesem. Man. N.Z. Fl.* (1906) 826; *Kukenth. in Pflanzenr.* Heft 38 (1909) 685.

South Island: Otago—Old Man Range, altitude 5000 ft., *Petrie!*

In the leaves and arrangement of the spikelets this approaches *C. decurtata*, but the narrow-ovoid trigonous utricle with its long serrate beak is quite different from the broad plano-convex utricle of *C. decurtata*. From *C. uncifolia* it also differs in the slender serrate beak of the utricle. From *C. Berggreni* it is removed by the green tapering acute leaves, and larger long-beaked utricles.

34. **C. decurtata** *Cheesem. in Trans. N.Z. Inst.* xxiv (1892) 414.—Small, densely tufted, glaucous-green. Culms short, 1–3 in. high, usually sheathed to the top by the leaves. Leaves numerous, much exceeding the culms, 2–6 in. long, $\frac{1}{25}$–$\frac{1}{15}$ in. broad, flat, or concave in front and convex behind, rigid, coriaceous, grooved; tips incurved when dry; margins scabrid. Spikelets 3–5, usually concealed amongst the leaves, short, stout, about $\frac{1}{4}$ in. long, very closely approximate; terminal one male, erect; remainder all female, spreading, ovoid or ovoid-oblong, sessile or the lowest very shortly pedunculate. Glumes broadly ovate or almost orbicular, acute or cuspidate, thin and membranous, reddish-brown or chestnut with a paler centre and margins. Utricles rather longer than the glumes, broadly ovoid or elliptic-ovoid, plano-convex or unequally biconvex, turgid on the back, obscurely nerved; margins thick, serrate above; beak short, stout, sharply bidentate. Styles 3. Nut sharply trigonous.—*Man. N.Z. Fl.* (1906) 827; *Ill. N.Z. Fl.* ii (1914) t. 216; *Kukenth. in Pflanzenr.* Heft 38 (1909) 685. C. cryptocarpa *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 412, 435 (*not of C. A. Mey.*).

South Island: Canterbury—Margins of ponds near Lake Tekapo, altitude 2500 ft. December–February.

A very curious and distinct little species.

35. **C. filamentosa** *Petrie in Trans. N.Z. Inst.* xlviii (1916) 191.—Densely tufted, copiously stoloniferous. Culms filiform, smooth, terete, faintly striate, 1½–4 in. long. Leaves 4–8 in. long, extremely narrow, glabrous, concave above, rounded below, finely serrate at the tip. Spikelets 3–4, crowded, or the lowermost somewhat distant, ovoid, about $\frac{1}{4}$ in. long; uppermost male, very slender; the two lower female, usually with 2–3

male flowers at the top, shortly pedicellate; bracts long, filiform. Glumes ovate, pale, membranous, strongly keeled, gradually narrowed into a short scabrid mucro. Utricles about as long as the glumes, turgid, elliptic, slightly stipitate, plano-convex, with two prominent lateral nerves, and faint intermediate ones, narrowed into a short broad obscurely bidentate beak. Styles 3.

STEWART ISLAND: Table Hill, *W. J. Murdoch!* high lands at Port Pegasus, *T. Kirk!* high lands at the head of Paterson Inlet, *H. Guthrie Smith!*

Probably *C. uncifolia* is the nearest ally of this curious little plant, which is mainly known from cultivated plants. Trans 48 : 191

36. **C. uncifolia** *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 412.—Brownish-red or green, forming lax or dense spreading tufts. Culms short, 1–4 in. high, usually sheathed to the top by the leaves. Leaves numerous, spreading, far exceeding the culms, 3–10 in. long, $\frac{1}{30}$–$\frac{1}{15}$ in. broad, rarely narrower and filiform, concave in front, convex on the back, grooved, tips often curled and twisted when dry; margins finely scabrid above. Spikelets 3–5, short, closely approximate or sometimes the lowest one remote, chestnut-brown to dark-brown, $\frac{1}{6}$–$\frac{1}{4}$ in. long; terminal one male, slender, erect; remainder all female, spreading, ovoid or oblong, all sessile or the lowest very shortly pedunculate. Glumes ovate, obtuse or cuspidate, membranous, chestnut-brown with a green centre; margins sometimes erose. Utricles longer than the glumes, narrowed at the base, elliptic-oblong, trigonous, more or less distinctly nerved, reddish-brown to blackish-brown, rarely pale; margins rounded, entire; beak very short, with an almost entire or obscurely 2-toothed mouth. Styles 3. Nut obovoid, trigonous.—*Trans. N.Z. Inst.* xxiv (1892) 415; *Man. N.Z. Fl.* (1906) 827; *Kukenth. in Pflanzenr.* Heft 38 (1909) 685.

Var. **libera** *Kukenth. in Pflanzenr.* Heft 38 (1909) 685.—Culms longer, not sheathed by the leaves to the top. Spikelets 4–5, often $\frac{1}{2}$ in. long. Glumes of the females notched at the top.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Apparently not uncommon in mountain districts throughout. 2000–4000 ft. December–February. Var. *libera:* Mount Arthur Plateau, Nelson, *T. F. C.*

37. **C. Dallii** *T. Kirk in Trans. N.Z. Inst.* xxvi (1894) 261.—Small, slender, laxly tufted, usually reddish-brown. Culms very slender, smooth, grooved, 4–10 in. high. Leaves shorter than the culms or almost equalling them, sheathing at the base, narrow, $\frac{1}{30}$–$\frac{1}{15}$ in. broad, concave in front, convex behind, grooved, narrowed into long filiform points; margins slightly scabrid above. Spikelets 3–5, narrow, $\frac{1}{4}$–$\frac{2}{3}$ in. long, more or less distant, the lowermost often almost basal, dark red-brown; terminal one male, slender; remainder all female, sometimes with a few male flowers below, sessile except the lowest, which is on a long filiform peduncle; bracts long, leafy. Glumes ovate, acuminate or slightly awned, membranous, reddish-brown. Utricles narrow-ovoid, obscurely trigonous, smooth or faintly nerved, dark purplish-black; margins entire; beak sharply 2-toothed. Styles 3. Nut trigonous.—*Cheesem. Man. N.Z. Fl.* (1906) 898. C. Traversii *T. Kirk in Trans. N.Z. Inst.* xxvi (1894) 262. C. Gibbsii *Petrie in Trans. N.Z. Inst.* xlvi (1913) 35.

SOUTH ISLAND: Nelson—Source of the Heaphy River, *Dall!* Dun Mountain, *H. H. Travers!* (*C. Traversii*); Cedar Creek, near Denniston, *Petrie!* (*C. Gibbsii*).

Under *C. Dallii* (which is itself very imperfectly known) I have for the present placed Kirk's *C. Traversii* and Petrie's *C. Gibbsii*. I have scanty material of all three. In the first edition of this work I stated my inability to satisfactorily distinguish *C. Dallii* and *C. Traversii*. Dr. Kukenthal is in very much the same position, and has even suggested merging both with *C. Petriei*, which appears to be an extreme view. Mr. Petrie states that his *C. Gibbsii* differs from *C. Dallii* in the short crowded spikelets and long filiform culms. But I have specimens of *C. Traversii* so close to it as almost to destroy the difference. I am therefore leaving the three species for more leisurely study when a satisfactory series of specimens has been obtained.

38. **C. Petriei** *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 413.—Densely tufted, usually brownish-red. Culms stout or rather slender, quite smooth, deeply grooved, leafy, 5–15 in. high. Leaves numerous, longer or shorter than the culms, broad and sheathing at the base, blade narrow, $\frac{1}{30}$–$\frac{1}{10}$ in. broad, deeply grooved, concave in front, convex behind, narrowed into long slender points that are usually curled and twisted when dry; margins scabrid. Spikelets 3–5, narrow-oblong, $\frac{1}{3}$–$\frac{2}{3}$ in. long, more or less approximate but not closely so, the lower one often remote; terminal one male, slender; remainder all female, sometimes with a few male flowers at the base, all stalked, but the stalks of the upper ones sometimes very short; bracts long, leafy. Glumes ovate, acute or shortly cuspidate, thin and membranous, pale, often almost white, but usually more or less stained with chestnut, rarely chestnut-brown; margins often lacerate. Utricles longer than the glumes, narrow-ovoid or elliptic-oblong, biconvex, rather turgid, smooth or obscurely nerved, shining, dark purplish-brown or almost black; margins entire; beak short, 2-toothed. Styles 3. Nut elliptic, trigonous. —*Man. N.Z. Fl.* (1906) 828; *Kukenth. in Pflanzenr.* Heft 38 (1909) 689.

Var. **rubicunda** *Kukenth. l.c.* 690.—Much smaller. Female spikelets shorter. Utricles more conspicuously nerved; beak very short.—C. rubicunda *Petrie in Trans. N.Z. Inst.* xxxi (1899) 355; *Cheesem. Man. N.Z. Fl.* (1906) 825.

South Island: Not uncommon in mountain districts, from Nelson to the south of Otago. 2000–5000 ft. December–February. Var. *rubicunda.*—North Island: Opepe, near Taupo, *T. F. C.* South Island: Lake Te Anau, *Petrie!* Mount Earnslaw, *Cockayne!*

Characterized by the broad sheathing base of the leaves, and their fine curled and twisted points; by the rather small and narrow spikelets, all of which are stalked, and the lower on filiform peduncles; by the usually pale-coloured glumes; and by the narrow-ovoid or elliptic turgid utricles, which are dark purplish-brown or almost black. *C. rubicunda*, I think, is nothing more than a depauperated state of *C. Petriei*, and I have therefore placed it as such, which is the view taken by Kukenthal.

39. **C. comans** *Berggr. in Minnesk. Fisiog. Sallsk. Lund.* (1877) 28, t. 7, f. 15–19.—Densely tufted, pale-green or reddish. Culms very slender, filiform, quite smooth, leafy, usually 6–18 in. high, but sometimes elongating in fruit and prostrate. Leaves longer or shorter than the culms, very narrow, filiform, $\frac{1}{30}$–$\frac{1}{15}$ in. broad, flat or concave in front, slightly rounded at the back, grooved and striate; margins scabrid. Spikelets 5–7, linear-oblong, $\frac{1}{3}$–$\frac{3}{4}$ in. long, $\frac{1}{8}$–$\frac{1}{5}$ in. broad; terminal one (rarely two) male, very slender; remainder all female, sometimes with a few male flowers at the base, usually distant, the lowermost sometimes almost basal, the upper two sessile, the rest on filiform peduncles, that of the lowermost often elongate; bracts long, filiform, far overtopping the spikelets. Glumes ovate, usually bifid, with a short hispid awn, membranous, pale-brown or red-brown; margins lacerate. Utricles rather longer than the glumes, lanceolate or elliptic-lanceolate, plano-convex or unequally biconvex, smooth

C. carei Petrie TNZI. 54:570.

or obscurely ribbed on the convex face, gradually narrowed into a rather long bidentate beak; margins sharply serrate above. Styles 3. Nut trigonous.—*Cheesem. in Trans. N.Z. Inst.* xvi (1884) 446; *Man. N.Z. Fl.* (1906) 829; *Kukenth. in Pflanzenr.* Heft 38 (1909) 689. C. Cheesemanii *Petrie in Trans. N.Z. Inst.* xv (1883) 358; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 437. C. pleiostachys *C. B. Clarke in Cheesem. Man. N.Z. Fl.* (1906) 829.

Var. **pulchella** *C. B. Clarke in Cheesem. Man. N.Z. Fl.* (1906) 829; *Kukenth. l.c.* 689.—Smaller. Spikelets usually 4, the lowermost remote and basal. Utricles shorter and broader, ovate-oblong, often smooth; beak shorter.—C. pulchella *Berggr. in Minneskr. Fisiog. Sallsk. Lund.* (1877) 29, t. 7, f. 20–26.

C. albula Atlant TNZI. 76:559.

Var. **stricta** *Cheesem. in Trans. N.Z. Inst.* xxiv (1892) 415.—Pale whitish-green. Culms short, 4–8 in. high, barely half the length of the strict erect leaves. Spikelets and glumes shining whitish-green. Utricles larger and broader, elliptic-ovoid, pale. Perhaps a distinct species.—*Cheesem. Man. N.Z. Fl.* (1906) 829.

var. subsessilis Kirk in Cheesem Trans 48: 24.

North and South Islands, Stewart Island: Not uncommon from Ahipara and Mangonui southwards. Var. *pulchella:* Bealey, *Berggren!* Maniototo Plain, *Petrie!* Var. *stricta:* Lake Tekapo, *T. F. C.* Sea-level to 3500 ft. November–February.

A very variable species, best separated from its allies by the filiform culms and leaves, narrow rather remote spikelets, and lanceolate or elliptic-lanceolate utricles, sharply toothed above. I have followed Mr. C. B. Clarke in reducing Berggren's *C. pulchella* to *C. comans*, the differences between the two being of no very great importance. In his review of *Carex* in the Pflanzenreich Dr. Kukenthal proposes to re-establish *C. Cheesemanii* as a variety of *C. comans;* but the only difference I can find of any moment is that it has rather broader spikelets and longer culms—characters of no great value. Mr. C. B. Clarke's *C. pleiostachys* (accidentally misprinted *C. plesiostachys* in the Manual, p. 829) I am now convinced is only a trivial form of *C. comans.*

Trans 42: 212

40. **C. litorosa** *Bailey in Memoirs Torrey Club* (1889) 72.—Pale-green, forming compact tufts. Culms densely packed, slender, erect, terete, grooved, quite smooth, leafy, 9–24 in. high. Leaves as long or longer than the culms, sheathing at the base, narrow, $\frac{1}{30}$–$\frac{1}{12}$ in. broad, deeply grooved, flat or concave in front, convex behind, narrowed into long filiform points; margins slightly serrate above. Spikelets 3–5, the lowermost often remote, the others closely placed or a little distant, oblong-ovate, $\frac{1}{4}$–$\frac{3}{4}$ in. long; terminal one male, slender; remainder all female, usually with male flowers either above or below, sessile or the lowermost shortly pedunculate; bracts very long and leafy. Glumes ovate, acuminate with a short or long awn, membranous, pale-brown; margins often lacerate. Utricles as long or rather longer than the glumes, broadly ovoid, turgid, biconvex, smooth or obscurely nerved, reddish-brown; margins smooth; beak short and stout, with 2 divergent teeth. Styles 3. Nut obovoid, trigonous.—*Cheesem. in Trans. N.Z. Inst.* xxiv (1892) 415; *Man. N.Z. Fl.* (1906) 830; *Ill. N.Z. Fl.* ii (1914) t. 217; *Kukenth. in Pflanzenr.* Heft 38 (1909) 690. C. littoralis *Petrie in Trans. N.Z. Inst.* xv (1883) 358; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 437 (*not of Schwein.*). C. australis *T. Kirk in Trans. N.Z. Inst.* xxvi (1894) 262 (*not of Boeck.*).

North and South Islands, Stewart Island: Not uncommon in brackish-water marshes from the Kaipara Harbour southwards. October–January.

Distinguished from *C. comans* by the larger size and stouter habit, broader spikelets, and especially by the broader and more turgid biconvex utricles, with entire margins and smooth or very obscurely nerved faces. The Otago and Stewart Island specimens have rather larger spikelets, with male flowers at the base of the female spikelets, whereas they are usually at the top in northern specimens.

41. **C. dissita** *Sol. ex Hook. f. Fl. Nov. Zel.* i (1853) 284.—Densely tufted. Culms slender, smooth, leafy, 1–2½ ft. high. Leaves longer or shorter than the culms, dark-green, flat, broad, grassy, deeply grooved, ⅛–¼ in. diam.; margins scabrid above. Spikelets 4–8, distant, ⅓–1 in. long, ¼–⅓ in. broad, dark-brown; terminal one male, slender, rarely with 1 or 2 much smaller ones near its base; remainder all female, but often with male flowers below, rarely at the top, shortly peduncled and erect, or the lower on longer peduncles and nodding; bracts long, leafy. Glumes broadly ovate, deeply bifid or almost entire, membranous, dark chestnut-brown with paler margins; midrib stout, produced into a short or rather long stout hispid awn. Utricles about equalling the glumes, ovoid, turgid, biconvex, obscurely nerved, pale- or dark-brown, sometimes almost black; margins often serrate above; beak short, with 2 stout often widely divergent teeth. Styles 3. Nut ovoid, trigonous.—*Boott Ill. Car.* i (1858) 65, t. 176; *Hook. f. Handb. N.Z. Fl.* (1864) 316; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 437; *Man. N.Z. Fl.* (1906) 830; *Kukenth. in Pflanzenr.* Heft 38 (1909) 691. C. longeacuminata *Col. in Trans. N.Z. Inst.* xxi (1889) 104. C. polyneura *Col. l.c.*

Var. **Lambertiana** *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 437.—Stouter. Leaves broader, ⅕–⅓ in. Spikelets longer and stouter, 1–2½ in. long. Glumes more deeply bifid.—C. Lambertiana *Boott in Hook. f. Fl. Nov. Zel.* i (1853) 284; *Ill. Car.* i (1858) t. 177; *Hook. f. Handb. N.Z. Fl.* (1864) 317.

Var. **ochrosaccus** *Cheesem.*—Culms usually overtopped by the leaves. Spikelets 4–9, pale, erect, short-stalked, lower often compound. Glumes with longer awns exceeding the utricles. Utricles pale, rather narrower.—C. ochrosaccus *C. B. Clarke MS. in Herb. Kew.*

Var. **monticola** *Kukenthal in Cheesem. Man. N.Z. Fl.* (1906) 831.—Smaller, 6–18 in. high. Leaves narrower. Spikelets 3–5, small, ¼–½ in. long, sessile or very shortly peduncled.

North and South Islands, Stewart Island: The typical form and var. *Lambertiana* abundant throughout. Var. *ochrosaccus:* Whangarei, *H. Carse!* Kaipara, *T. Kirk!* vicinity of Auckland, *T. F. C.* Var. *monticola:* Not uncommon in turfy swamps in the mountains of both Islands. Sea-level to 3500 ft. October–January.

A most abundant and variable species. It can be distinguished from its allies by the broad flat grassy leaves, usually solitary male spikelets, distant stout dark-coloured female spikelets, which are generally on short peduncles, broad often deeply bifid glumes with a hispid awn of varying length, and broadly ovoid turgid utricles, which are usually obscurely nerved. Kukenthal unites my var. *ochrosaccus* with the Norfolk Island *C. Neesiana*, placing it as *C. dissita* var. *Neesiana*. But a Norfolk Island specimen received many years ago from Baron Mueller does not support this view.

42. **C. Solandri** *Boott in Hook. f. Fl. Nov. Zel.* i (1853) 284.—Densely tufted. Culms tall, slender, trigonous, slightly scabrid above, leafy, 1–3 ft. high, often elongating in fruit and becoming prostrate. Leaves long, narrow, keeled, $\frac{1}{10}$–⅙ in. broad; margins and keel sharply scabrid. Spikelets 5–10, distant, on long slender peduncles, long and narrow, ¾–2 in. long by about ⅛ in. broad, dark-brown; terminal 1–4 male, slender, usually closely placed; remainder all female, but generally with a few male flowers below, nodding, the 2 or 3 lowest often compound, on longer filiform peduncles; bracts long and leafy. Glumes broadly ovate, entire or bifid, membranous, dark or pale chestnut-brown; midrib produced into an awn of variable length. Utricles about equalling the glumes, ovoid,

turgid, unequally biconvex or obscurely trigonous, dark red-brown or purplish-black, rarely pale-brown, narrowed into a short sharply bidentate beak; margins smooth or serrate above. Styles 3. Nut ovoid, trigonous.—*Ill. Car.* i (1858) 61, t. 175; *Cheesem. Man. N.Z. Fl.* (1906) 832. C. dissita *var.* Neesiana *Kukenth. in Pflanzenr.* Heft 38 (1909) 691. C. Neesiana *Hook. f. Handb. N.Z. Fl.* (1864) 316; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 438 (*not of Endl.*).

North and South Islands, Stewart Island: Not uncommon from Ahipara and Mangonui southwards, usually in woods. Sea-level to 2000 ft. October–January.

Reduced to *C. dissita* by Kukenthal, as var. *Solandri*. No doubt there are transition states between the two plants—in the river valleys of north-west Nelson, for instance, where *C. Solandri* is particularly abundant, such may be commonly observed. But what I take to be the typical form is a much larger and more slender plant, with longer culms (sometimes over 5 ft. in length) that are often prostrate in fruit. The male spikelets (which are seldom more than one in *C. dissita*) are often as many as four or five; and the lower female spikelets are usually compound, with long nodding peduncles. These characters recede so much from the ordinary state of *C. dissita* that I cannot refuse to regard the two plants as distinct.

43. **C. ventosa** *C. B. Clarke in Cheesem. Man. N.Z. Fl.* (1906) 832.—Culms tall, robust, trigonous, 18 in. high, leafy at the base. Leaves equalling the culms or shorter than them, pale-green, smooth and glabrous, striate, flat, $\frac{1}{4}$ in. broad, sheathing at the base. Inflorescence 12–14 in. long; spikelets 6–8, $\frac{3}{4}$–3 in. long, pale; terminal 2–3 male, slender, approximate; remainder all female, erect, on long peduncles varying from $1\frac{1}{2}$–3 in. Utricles about $\frac{1}{8}$ in. long, elliptic-oblong, trigonous, narrowed at both ends, 12-nerved, stramineous; beak short. Nut elliptic-oblong, trigonous, black.—*C. B. Clarke in Kew Bulletin Additional Series*, xiii (1908) 83.

Chatham Islands: *H. H. Travers, W. R. B. Oliver!*

I have not seen authenticated specimens of this plant. Mr. C. B. Clarke, who communicated to me the brief notes upon which the above diagnosis has been based, considered that it should be placed in the vicinity of the Norfolk Island *C. Neesiana*; from which, however, it is removed by the larger and narrower utricle. For the present, I have associated with it a plant collected on the Chatham Islands by Mr. W. R. B. Oliver, specimens of which have been kindly lent to me by Mr. Petrie.

44. **C. longiculmis** *Petrie in Trans. N.Z. Inst.* xiv (1882) 363.—Tall, densely tufted. Culms terete or nearly so, smooth, 2–3 ft. high or more, leafy at the base. Leaves shorter than the culms or equalling them, pale-green, sheathing at the base, $\frac{1}{6}$–$\frac{1}{5}$ in. broad, flat or keeled, striate; margins slightly scabrid above. Spikelets 5–7, the lowermost usually distant, the remainder approximate; terminal one male, slender, 1–2 in. long, sometimes with a smaller one near its base; remainder all female, usually with a few male flowers at the base, rarely at the top, very large and stout, $\frac{3}{4}$–$1\frac{1}{2}$ in. long, $\frac{1}{3}$–$\frac{1}{2}$ in. broad, pale-brown, sessile or the lowest shortly peduncled; bracts leafy, far exceeding the inflorescence. Glumes broadly ovate, membranous, pale chestnut-brown, midrib produced into a stout hispid awn. Utricle equalling the glumes, somewhat stipitate, ovoid, biconvex, nerved, pale- or dark-brown, suddenly contracted into a rather long and stout bidentate beak; margins smooth. Styles 3. Nut trigonous.—*Cheesem. in Trans. N.Z. Inst.* xvi (1884) 438; *Man. N.Z. Fl.* (1906) 832; *Kukenth. in Pflanzenr.* Heft 38 (1909) 692.

Stewart Island: Paterson's Inlet, *Petrie! Thomson!* Glory Cove, *T. Kirk!*

A very distinct species, perhaps nearest to *C. litorosa*, but much larger in all its parts.

45. **C. Chathamica** *Petrie in Trans. N.Z. Inst.* xlvii (1915) 55.—Culms 18–24 in. high, stout, smooth, erect, triquetrous. Leaves shorter than the culms, scarcely sheathing at the base, flat, smooth, $\frac{1}{4}$ in. broad or more, 3-nerved above, striate beneath with a conspicuous midrib, margins thickened and finely scabrid. Spikelets 7, simple or very rarely compound, 1–2$\frac{1}{2}$ in. long; the 3 uppermost male, slender, closely placed; the remainder female or with a few male flowers at the top, erect, distant, the lower ones with long peduncles. Bracts long, leafy. Glumes linear-lanceolate, acute or acuminate, membranous, produced into a short mucro, 1-nerved, chestnut-brown with a pale centre. Utricles shorter than the glumes, turgidly biconvex, strongly 2-nerved, dark-brown, smooth and shining, shortly stipitate, suddenly narrowed above into a short smooth bidentate beak. Styles 3.

Chatham Islands: Swampy ground; *W. R. B. Oliver!*

I have only seen two very indifferent specimens, for the loan of which I am indebted to Mr. Petrie.

46. **C. trifida** *Cav. Ic.* v (1799) 41, t. 465.—A very tall and stout species, forming dense tussocks 1–2 ft. diam. Culms stout, erect, 2–4 ft. high, obtusely trigonous, quite smooth, thickened at the base, copiously leafy. Leaves very large, overtopping the culms, 3–6 ft. long, $\frac{1}{3}$–$\frac{1}{2}$ in. broad, sheathing at the base, keeled, rigid, striate; margins scabrid. Spikelets 6–12, very large and stout, 3–5 in. long, $\frac{1}{3}$–$\frac{2}{3}$ in. broad; upper 2–4 male, rather closely placed, sessile or nearly so; lower 4–6 female, farther apart, shortly stalked, the lowest often compound; bracts long, leafy. Glumes linear-oblong or lanceolate, deeply bifid, membranous, chestnut-brown; midrib produced into a long hispid awn. Utricle shorter than the glumes or almost equalling them, stipitate and attenuate at the base, oblong-obovoid, turgid, obsoletely trigonous, strongly nerved, rather abruptly contracted into a 2-toothed beak. Styles 3. Nut obovoid-oblong, trigonous. —*Raoul Choix* (1846) 40; *Hook. f. Fl. Antarct.* i (1844) 89; *Fl. Nov. Zel.* i (1853) 284; *Handb. N.Z. Fl.* (1864) 316; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 439; *Man. N.Z. Fl.* (1906) 833; *Kukenth. in Pflanzenr.* Heft 38 (1909) 731; *Cheesem. Vascl. Flora Macquarie Is.* (1919) 32. C. incrassata *Sol. ex Boott Ill. Car.* iv (1867) 138.

South Island: Marlborough—Queen Charlotte Sound, *Banks* and *Solander*. Canterbury—Akaroa, *Raoul*. Otago—Near Dunedin, *Buchanan! Lindsay, Petrie!* Bluff Hill, *T. Kirk!* Dusky Sound, *Lyall*. Stewart Island: *Petrie!* The Snares, Auckland and Campbell Islands, Antipodes Island, Macquarie Island: Not uncommon. *Sir J. D. Hooker, T. Kirk! A. Hamilton!* See Cavill Esc. e. 17 4:1935:111

Also in temperate South America, from Chile to Fuegia and the Falkland Islands. The large size, stout habit, and numerous massive spikelets readily distinguish it from any other species found in New Zealand.

47. **C. breviculmis** *R. Br. Prodr.* (1810) 242.—Culms short, tufted, erect or spreading from the base, 1–6 in. high. Leaves very much longer than the culms, spreading, $\frac{1}{20}$–$\frac{1}{12}$ in. broad, flat, grooved; margins slightly scabrid above. Spikelets 2–5, small, green, approximate, $\frac{1}{6}$–$\frac{1}{3}$ in. long; terminal one male; remainder all female, sometimes with male flowers at the top, erect, sessile or the lowest very shortly pedunculate; bracts long, narrow, leafy. Glumes laxly imbricate, ovate, pale-green, membranous; midrib stout, produced into a long hispid awn. Utricles shorter than the glumes, stipitate, narrow-elliptic, trigonous, faintly many-nerved, green, pubescent, narrowed upwards into a short pyramidal beak. Styles 3.

Nut elliptic-obovoid, trigonous; style-base dilated just above the top of the nut.—*Hook. f. Fl. Nov. Zel.* i (1853) 283, t. 63A; *Handb. N.Z. Fl.* (1864) 316; *Fl. Tasm.* ii (1860) 101; *Benth. Fl. Austral.* vii (1878) 445; *Boott Ill. Car.* iv (1867) 181; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 439; *Man. N.Z. Fl.* (1906) 833; *Kukenth. in Pflanzenr.* Heft 38 (1909) 469.

North and South Islands: Abundant from the North Cape to Foveaux Strait. Sea-level to 3000 ft. October–March.

Easily recognized by the small size and pubescent utricles. Also found in Australia and Tasmania, the Himalaya Mountains, China, and Japan.

48. **C. pumila** *Thunb. Fl. Jap.* (1784) 39.—Rhizome long, creeping, often many feet in length. Culms short, stout, 4–8 in. high, leafy throughout. Leaves much longer than the culms, $\frac{1}{15}$–$\frac{1}{8}$ in. broad, rigid, keeled, grooved, glaucous-green, recurved above, tapering into long subulate points. Spikelets 3–6, approximate; terminal one male, slender, $\frac{3}{4}$–1 in. long, often with one or two much smaller ones near its base; remainder all female, sometimes with male flowers at the top, oblong, stout, $\frac{1}{2}$–$\frac{3}{4}$ in. long, $\frac{1}{4}$–$\frac{1}{3}$ in. broad, sessile or the lowest shortly pedunculate; bracts long and leafy. Glumes ovate-oblong, membranous, chestnut-brown with pale hyaline margins; midrib stout, produced into a short awn or barely excurrent. Utricle very large, much exceeding the glumes, $\frac{1}{5}$–$\frac{1}{4}$ in. long, thick and corky, turgid, ovoid, smooth or obsoletely nerved, brown, narrowed into a short bidentate beak. Styles 3. Nut brown, ovoid, trigonous.—*Boott Ill. Car.* iv (1867) 217; *Hook. f. Handb. N.Z. Fl.* (1864) 315; *Benth. Fl. Austral.* vii (1878) 445; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 439; *Man. N.Z. Fl.* (1906) 834; *Kukenth. in Pflanzenr.* Heft 38 (1909) 738. C. littorea *Lab. Pl. Nov. Holl.* ii (1806) 69, t. 219; *Raoul Choix* (1846) 40; *Hook. f. Fl. Nov. Zel.* i (1853) 284.

var. macrocarpa Carse.

North and South Islands: Sandy shores from the North Cape to Foveaux Strait, abundant. October–January. See Trans. Roy. Soc. N.Z. 64: 1934: 111

Very distinct from any other New Zealand species. The long running rhizomes, glaucous keeled leaves, and large smooth and turgid utricles are conspicuous characters. Common in Australia and Tasmania, along the eastern coasts of Asia, and in extra-tropical South America. It is a useful plant in the reclamation of sand-dunes.

49. **C. Brownii** *Tuckerm. Enum. Car.* (1843) 21.—Culms tufted, slender, smooth, leafy at the base, 8–16 in. high. Leaves shorter than the culms, flat, grassy, $\frac{1}{8}$–$\frac{1}{6}$ in. broad; margins smooth or very slightly scabrid. Spikelets 3–4; terminal one male, small, $\frac{1}{5}$–$\frac{1}{2}$ in. long, slender, often few-flowered; remainder all female, $\frac{1}{3}$–$\frac{2}{3}$ in. long, about $\frac{1}{4}$ in. broad, dusky-brown, the two upper close together, on very short peduncles or subsessile, the third (when present) usually remote, on a slender erect peduncle sometimes 3 in. long; bracts leafy, rather short, but the upper exceeding the inflorescence. Male glumes narrow, membranous, terminating in a very long foliaceous awn. Female glumes with a small lanceolate or linear-oblong base ending in a serrulate awn equalling or shorter than the utricle. Utricles spreading when ripe, about $\frac{1}{8}$ in. long, broadly oblong or ovoid, turgid, obscurely trigonous, strongly nerved, dull-brown; beak very short, tipped with 2 pale-brown teeth. Styles 3. Nut obovoid-oblong, pale, trigonous.—*Boott Ill. Car.* iv (1867) 161, t. 532; *Benth. Fl. Austral.* vii (1878) 447; *Cheesem. Man. N.Z. Fl.* (1906) 834; *Kukenth. in Pflanzenr.* Heft 38 (1909) 612. C. striata *R. Br. Prodr.* (1810) 243 (*not of Michaux*).

North Island: Auckland — Marshes at Lake Tongonge, near Kaitaia, rare, *R. H. Matthews! H. Carse!*

An Australian plant, ranging from Queensland to Victoria; also found in Japan. Mr. Matthews, who is the first to observe it in New Zealand, considers it to be indigenous, and there is nothing improbable in its occurrence in the extreme north of the Dominion.

50. **C. Oederi** *Retz. Fl. Scand. Prodr.* (1779) 179; *var.* **cataractae** *Kukenth. in Pflanzenr.* Heft 38 (1909) 673. — Rhizome short, tufted. Culms tufted, smooth, trigonous with the angles somewhat acute, leafy, 2–8 in. high. Leaves usually longer than the culms in New Zealand specimens, yellow-green when dry, flat, $\frac{1}{15}$–$\frac{1}{8}$ in. broad, spreading or recurved; margins slightly scabrid. Spikelets 3–8, yellow-green, closely approximate or rarely the lowest remote; terminal one (rarely two) male, slender, $\frac{1}{4}$–$\frac{3}{4}$ in. long; remainder all female but usually with a few male flowers at the top, ovoid or roundish, $\frac{1}{4}$–$\frac{1}{2}$ in. long, squarrose, sessile or the lowest sometimes peduncled; bracts long, leafy, spreading. Glumes ovate, obtuse, membranous; margins pale, sometimes hyaline. Utricles much exceeding the glumes, spreading or deflexed, ovoid, trigonous, inflated, strongly ribbed, pale yellow-green, suddenly narrowed into a long slender scabrid 2-toothed beak. Styles 3. Nut obovoid, trigonous.—C. cataractae *R. Br. Prodr.* (1810) 242; *Hook. f. Fl. Tasm.* ii (1860) 101, t. 151; *Handb. N.Z. Fl.* (1864) 315; *Boott Ill. Car.* iv (1867) 204. C. flava *Benth. Fl. Austral.* vii (1878) 444; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 439; *Man. N.Z. Fl.* (1906) 835.

South Island, Stewart Island: Mountain districts from Nelson southwards, usually in mountain-swamps. Generally from 1500 to 3500 ft., but descends to sea-level in Stewart Island and several scattered localities on the mainland. December–February.

It is quite an unsettled question whether the two plants known as *C. flava* and *C. Oederi* should be kept as distinct species or as varieties. In the first edition of this work I followed the opinion of Mr. C. B. Clarke in uniting them. *C. Oederi* mainly differs from *C. flava* in the smaller size and shorter nearly straight beak to the utricle. It is little more than a matter of taste as to how the two plants should be dealt with. Kukenthal's undoubted experience with both of them in the Northern Hemisphere, where they are plentiful, has mainly induced me to follow his views. The variety *cataractae* is not uncommon in the Southern Hemisphere, being known from New Zealand, Tasmania, South Africa, and temperate South America.

51. **C. vacillans** *Sol. ex Boott in Hook. f. Fl. Nov. Zel.* i (1853) 285.—Culms tufted, slender, weak, triquetrous with the angles scabrid, leafy, 10–18 in. high. Leaves longer or shorter than the culms, $\frac{1}{8}$–$\frac{1}{4}$ in. broad, flat or keeled towards the base, striate, usually with a conspicuous nerve on each side of the stout midrib; margins and midrib beneath sharply scabrid. Spikelets 4–9, 1–3 in. long, about $\frac{1}{8}$ in. broad, bright red-brown; terminal 1–3 male, sometimes mixed with a few female flowers; remainder female, usually with a few male flowers at the base, the two or three lower ones remote, nodding, on long filiform peduncles, the upper ones closer together and on shorter stalks or subsessile; bracts long, leafy. Glumes ovate-lanceolate or oblong-lanceolate, entire, gradually narrowed into a short or rather long awn, red-brown; margins paler, often lacerate. Utricles usually longer than the glumes, stipitate, fusiform, triquetrous, conspicuously costate-nerved, red-brown, narrowed into a long slender beak with 2 acute teeth. Styles 3. Nut elliptic-oblong, whitish, trigonous. —*Boott Ill. Car.* iv (1867) 202; *Hook. f. Handb. N.Z. Fl.* (1864) 317; *Cheesem.*

in Trans. N.Z. Inst. xvi (1884) 440; *Man. N.Z. Fl.* (1906) 835; *Kukenth. in Pflanzenr.* Heft 38 (1909) 694. C. spinirostris *Col. in Trans. N.Z. Inst.* xv (1883) 335.

North Island: Not uncommon on declivities in dry woods, especially near the sea. October–November.

A very distinct species, easily recognized by the long and very slender red-brown spikelets, narrow entire glumes, and fusiform strongly ribbed long-beaked utricles.

52. **C. Cockayniana** *Kukenth. in Cheesem. Man. N.Z. Fl.* (1906) 836.—Culms slender, trigonous, smooth or slightly scabrid, leafy, 1–2 ft. high. Leaves usually longer than the culms, $\frac{1}{5}$–$\frac{1}{3}$ in. broad, flat, striate; margins scabrid above. Spikelets 5–8, $1\frac{1}{2}$–3 in. long, about $\frac{1}{4}$ in. broad, usually remote but sometimes the upper approximate, bright red-brown or pale-brown; terminal one male, generally with female flowers at the top, which sometimes occupy quite $\frac{1}{2}$ the spikelet; remainder all female, usually with male flowers at the base, all on filiform peduncles and nodding, or the upper almost sessile and erect; bracts long, leafy. Glumes ovate-lanceolate, entire or emarginate, membranous, red-brown; keel greenish, produced into a short awn. Utricles equalling the glumes or rather shorter than them, spreading when ripe, stipitate, narrow-elliptic, trigonous, strongly costate-nerved, pale yellow-brown, narrowed into a short stout minutely 2-toothed beak. Styles 3. Nut trigonous.—C. cinnamomea *Cheesem. in Trans. N.Z. Inst.* xiv (1882) 301 (*not of Olney*). C. Forsteri *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 440 (*in part*). C. Forsteri *var.* Cockayniana *Kukenth. in Pflanzenr.* Heft 38 (1909) 992.

South Island: Nelson—Graham River; sources of the Takaka River, *T. F. C.*; Mount Kelvin (near Westport), *W. Townson!* Westland—Kelly's Hill, *Petrie! Cockayne!* Franz Josef Glacier, *Cockayne.* Otago — Clinton Valley, *Petrie!* 500–4000 ft. November–January.

This differs from *C. vacilans* in the stouter habit, broader leaves, thicker spikelets, and broader and shorter utricles, which want the slender deeply bifid beak of that species. Kukenthal is now disposed to reunite it with *C. Forsteri.* As I have stated elsewhere, it is very much a matter of personal taste as to whether the two plants should be combined or kept apart. My own opinion is that the claims of *C. Cockayniana* to be regarded as distinct are quite as good as those of several species universally accepted.

53. **C. semi-Forsteri** *C. B. Clarke in Cheesem. Man. N.Z. Fl.* (1906) 836.—Culms tufted, stout, triquetrous, slightly scabrid above, 1–3 ft. high. Leaves numerous, usually longer than the culms, broad, $\frac{1}{5}$–$\frac{1}{3}$ in. diam. or even more, flat, coarsely ribbed or striate, often with a stout rib on either side of the midrib; margins and midrib beneath sharply scabrid. Spikelets 5–10, the lowermost distant, long-peduncled, simple or compound; the remainder more or less aggregated, the lower ones usually compound, the upper simple, 1–3 in. long, $\frac{1}{4}$–$\frac{1}{3}$ in. broad; terminal 1 or 2 male at the base; with the upper half or sometimes three-quarters female; the remainder all female, but usually with a few male flowers at the base; bracts very long and leafy. Glumes ovate-lanceolate, membranous, 3-nerved, pale ferruginous or whitish-green; midrib pale, produced into a short or long serrulate awn. Utricles longer or shorter than the glumes, narrowed at both ends, elliptic-oblong, trigonous, about 15–16-nerved; beak long, scabrid, with two somewhat spreading teeth.—*Kew Bulletin Additional Series,* viii (1908) 78. C. Forsteri *var.* insularis *Oliver in Trans. N.Z. Inst.* xlii (1910) 164. C. Kermadecensis *Petrie in Trans. N.Z. Inst.* xlvii (1915) 56.

KERMADEC ISLANDS: Apparently abundant in Sunday Island, *T. F. C.*, *Miss Shakespear!* *W. R. B. Oliver!* NORTH ISLAND: Mr. Clarke quotes "*Stephenson* n. 44, partim; *Hooker* n. 4189; *Colenso* n. 1622," but I have seen no specimens from the mainland of New Zealand that I can refer to the species. My statement in the Manual to the effect that the species is not uncommon in the North and South Islands is incorrect, and was due to a misapprehension of Mr. Clarke's correspondence.

54. **C. Forsteri** *Wahl. in Vet. Akad. Nya Handl. Stockh.* (1803) 154.—Culms tufted, stout or rather slender, trigonous, grooved, scabrid above, leafy, 1½–3 ft. high. Leaves longer or shorter than the culms, broad, ⅕–⅓ in. diam., flat, harsh, striate; margins and midrib beneath sharply scabrid. Spikelets 5–10, distant, 1½–3 in. long, ¼–⅓ in. broad, green or pale ferruginous; terminal 1–3 (usually 2) male, slender; remainder all female but commonly with male flowers either above or below, the upper 2–3 sessile or nearly so, the rest pedunculate, sometimes compound; bracts very long and leafy. Glumes ovate-lanceolate, membranous, ferruginous with a pale-green centre; midrib stout, produced into a short or rather long awn. Utricles equalling or exceeding the glumes, spreading when ripe, almost sessile or very shortly stipitate, elliptic-oblong or lanceolate-oblong, trigonous, nerved; beak ½–⅔ the length of the utricle, linear, with 2 lanceolate acute teeth. Styles 3. Nut obovoid-oblong, trigonous. — *Boott in Hook. f. Fl. Nov. Zel.* i (1853) 285; *Hook. f. Handb. N.Z. Fl.* (1864) 315 (*in part*); *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 440; *Man. N.Z. Fl.* (1906) 837; *Kukenth. in Pflanzenr.* Heft 38 (1909) 694. C. debilis *Forst. f. Prodr.* (1786) n. 550 (*name only*). C. punctulata *A. Rich. Fl. Nouv. Zel.* (1832) 119, t. 21.

NORTH AND SOUTH ISLANDS: Not uncommon from the Three Kings Islands and the North Cape southwards to Foveaux Strait. Sea-level to 2000 ft. November–January.

55. **C. pseudo-cyperus** *Linn. Sp. Plant.* (1753) 978. — Culms tufted, stout, triquetrous, scabrid on the angles, leafy, 1–3 ft. high. Leaves often longer than the culms, flat, broad, grassy, ⅓–½ in. diam.; margins scabrid. Spikelets 3–5, rarely more, usually clustered towards the top of the stem or the lowest one remote, 1–2½ in. long, pale-green; terminal one male, rarely female at the top, slender; remainder all female, long-peduncled and nodding, or in small specimens subsessile and erect, dense-flowered; bracts long, leafy. Glumes small, greenish-white, linear-oblong, suddenly narrowed into a stout serrulate awn. Utricles usually exceeding the glumes, spreading or even reflexed when ripe, stipitate, ovate-lanceolate, trigonous, somewhat inflated, strongly ribbed, greenish; beak ⅓–½ as long as the utricle, deeply split at the apex into two long and narrow almost pungent teeth. Styles 3. Nut small, obovoid, trigonous.—*R. Br. Prodr.* (1810) 243; *Boott Ill. Car.* iv (1867) 140, t. 451–52; *Benth. Fl. Austral.* vii (1878) 448; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 441; *Man. N.Z. Fl.* (1906) 837; *Kukenth. in Pflanzenr.* Heft 38 (1909) 695.

Var. **fascicularis** *Boott Ill. Car.* iv (1867) 141. — Rather taller and stouter. Spikelets 2–4 in. long, often pale red-brown when mature, farther apart and on longer peduncles, that of the lowest sometimes 4–8 in. long. Utricles broader and more truncate at the base, suddenly narrowed into a longer linear stalk; beak narrower.—*Kukenth. in Pflanzenr.* Heft 38 (1909) 696. C. fascicularis *Sol. in Hook. f. Fl. Nov. Zel.* i (1853) 283; *Fl. Tasm.* ii (1860) 101. C. Forsteri *var.* fascicularis *Hook. f. Handb. N.Z. Fl.* (1864) 315.

NORTH AND SOUTH ISLANDS: The species and variety not uncommon in swampy localities throughout. Sea-level to 3000 ft. November–February.

C. pseudo-cyperus, in its typical state, is plentiful in temperate and cool mountainous regions in most parts of the world; but the var. *fascicularis* exists only in New Zealand, Australia, and Tasmania. Kukenthal maintains, but as a "form" only, Boott's var. *minor*, ascribing to it Boeckeler's name of "*novae-seelandiae*." It only differs in its smaller size, fewer spikelets, and smaller utricles.

Family XIV. **PALMAE.**

Woody plants, usually with an erect stem bearing a terminal crown of large pinnate or fan-shaped leaves, rarely climbing or decumbent. Flowers regular, hermaphrodite or unisexual, small, numerous, arranged in spikes or panicles called spadices, which are enclosed when young within a large and broad deciduous bract called a spathe. Perianth inferior, coriaceous, persistent, of 6 segments in 2 series; the outer imbricate, often united into a 3-toothed or -lobed cup; the inner usually valvate. Stamens generally 6 or 3, rarely more, inserted at the base of the perianth; filaments free or connate, subulate or filiform; anthers versatile. Ovary superior, 1- or 3-celled, or of 3 distinct carpels; style very short or wanting; stigmas 3, sessile; ovules solitary (rarely 2) in each cell. Fruit a drupe or berry; exocarp thick, spongy, fleshy, or fibrous; endocarp membranous or crustaceous or bony. Seed with copious horny cartilaginous or oily albumen; embryo small, in a cavity near the surface of the albumen.

A majestic order, comprising nearly 130 genera and about 1100 species, almost wholly confined to tropical or warm extratropical regions, a few only found in northern or southern temperate latitudes. Few families are more generally useful, or applied to a greater variety of purposes. The timber, the foliage, the fruit, the starchy pith, and the fermentable sap are all employed. The coconut, date, sago-palm, cabbage-palm, betel-palm, African oil-palm, &c., are some of the best known species. The single genus found in New Zealand also occurs in Norfolk Island.

RHOPALOSTYLIS Wendl. and Drude. 1875

Stems tall, erect, unarmed, marked with annular scars. Leaves forming a terminal crown, pinnate; petiole long, furnished at the base with a long and broad sheathing part. Leaflets long, narrow, acuminate, slightly falcate at the apex, 3-costulate; secondary nerves several, distant; margins thin. Inflorescence at the base of the leaves, consisting of a much and densely branched spadix enclosed within two boat-shaped spathes of nearly equal size. Flowers monoecious, in glomerules of 3, a female in the centre, with a male on each side of it. Male flowers: Sepals subulate-lanceolate. Petals rather larger, obliquely ovate, acuminate, valvate. Stamens 6, free; filaments almost filiform, inflected at the tip; anthers linear-oblong, dorsifixed. Female flowers smaller and broader than the male, globose-ovoid; sepals broadly imbricate; petals convolute-imbricate at the base, valvate at the tips; ovary ovoid. Fruit small, elliptical or ovoid-oblong or almost globose, symmetrical; exocarp fleshy and succulent; endocarp fibrous within. Seed erect; albumen smooth, homogeneous. Embryo basal.

A genus consisting of three species, one of which is confined to New Zealand proper, another to the Kermadec Islands, while the third is restricted to Norfolk Island.

Stem slender, 15–30 ft. high. Seed ovoid-elliptical .. .. 1. *R. sapida.*
Stem stout, 30–60 ft. high. Seed globose .. .. .. 2. *R. Cheesemanii.*

1. **R. sapida** *Wendl. and Drude in Kerch. Palm.* 255.—Stem rather slender, smooth, 10–25 ft. high, 6–9 in. diam., rarely more. Leaves 4–8 ft. long; rhachis clothed with copious lepidote scales; leaflets very numerous, 2–3 ft. long or more, 1–2 in. broad, linear-ensiform, midrib and main veins covered with lepidote scales; margins replicate at the base. Spadix 1–2 ft. long, much and closely branched, glabrous; spathes 2 or 3. Flowers very densely crowded, purplish-lilac. Drupe ½ in. long, elliptic-oblong, bright-red. —*Cheesem. Man. N.Z. Fl.* (1906) 740. Areca sapida *Soland. ex Forst. f. Pl. Escul.* (1786) 66; *A. Rich. Fl. Nouv. Zel.* (1832) 157; *A. Cunn. Precur.* (1836) n. 298; *Raoul Choix* (1846) 40; *Hook. f. Fl. Nov. Zel.* i (1853) 262, tt. 59, 60; *Handb. N.Z. Fl.* (1864) 288; *Bot. Mag.* t. 5139. Kentia sapida *Mart. Hist. Palm.* iii (1823) 312.

North Island: Abundant in forests throughout, except in the central mountainous portion. South Island: In lowland districts not far from the coast as far south as Banks Peninsula and Hokitika, rare and local. Chatham Islands: *F. A. D. Cox!* Sea-level to 2000 ft. *Nikau.* January–April.

The nikau-palm, so well known to all residents in the northern half of the Dominion, is of special interest as being the most southern member of its family. The unexpanded central bud and the very young spadix are both edible, and were formerly eaten by the Maoris, and even by European settlers. Branched specimens are occasionally seen; a very remarkable one with no less than 11 branches has been described and figured by Mr. Percy Smith (Trans. N.Z. Inst. x (1878) 357, t. 15). Two others are figured by myself in vols. xxxix (1907) and xlii (1910) of the same publication.

2. **R. Cheesemanii** *Beccari in Trans. N.Z. Inst.* xlix (1917) 47.—A noble palm with a rather stout stem 30–60 ft. in height, and a trunk over 12 in. diam. Primordial leaves with the blade 5–8 in. long, deeply bifid, or formed by two lanceolate leaflets united by their bases. Adult leaves pinnate; leaflets narrow-ensiform, acuminate, green above, subglaucescent beneath, distinctly 3-costulate; midrib and main veins more or less covered with brownish scales. Spadix 2 ft. long or even more, much branched; the branches thick and angular. Fruit globose, ⅓–½ in. diam.; exocarp slightly fleshy; endocarp thin, cartilaginous, closely enveloping the seed. Seed globose; outer coat light-coloured and almost polished.—R. Baueri *Cheesem. in Trans. N.Z. Inst.* xx (1888) 174; *Man. N.Z. Fl.* (1906) 740 (*not of Wendl. and Drude*); *Cockayne Veg. N.Z.* (1921) t. 84.

Kermadec Islands: Sunday Island, abundant from sea-level to the tops of the hills, altitude 1500 ft., *T. F. C., Miss Shakespear! W. R. B. Oliver!*

Family XV. **LEMNACEAE.**

Minute gregarious floating water-plants, without distinct stems or true leaves, consisting of green scale-like fronds free from one another or 2–3 cohering by their margins, either rootless or more generally giving off 1 or several capillary rootlets from the under-surface. Flowers very seldom produced, most minute, placed in clefts on the edges of the frond, or sunk on its surface, naked or enclosed in a spathe, usually a single female with 1 or 2 males by its side. Perianth wanting in both sexes. Male flower: Stamens 1 or 2; filaments short; anthers 1–2-celled. Female: Ovary sessile, 1-celled, narrowed into a short and stout style; stigma simple; ovules 1–7. Fruit a somewhat fleshy utricle, with 1 or several seeds; albumen fleshy or wanting; embryo straight, axile.

An order of 2 genera and 20 species, found in still waters in all countries, both temperate and tropical. It contains the smallest of all known flowering-plants, all of them being of exceedingly simple structure, and very seldom found in flower.

L. oligorrhiza Trans. 60: 563. & 65: 3.

1. **LEMNA** Linn. 1735.

Fronds proliferous from the sides near the base, with one or several delicate root-fibres descending from the under-surface. Flowers in marginal clefts of the fronds. Filaments slender; anthers didymous, 2-celled; pollen globose, muricate. Ovary with 1–7 ovules. Fruit a 1–7-seeded utricle. Seeds erect or horizontal; embryo conic or ovoid.

A small genus of 8 or 9 species, most of them of almost world-wide distribution. The two following are all that are positively known to occur in New Zealand, but others will probably be found.

Root single. Fronds broadly ovate, thin, almost flat on both surfaces. Ovule solitary	1. *L. minor.*
Root single. Fronds broadly ovate, thick, conspicuously tumid beneath. Ovules 2	2. *L. gibba.*

Ex ? 1. **L. minor** *Linn. Sp. Plant.* (1753) 970.—Root solitary, the sheath at its base without appendages. Frond symmetrical, $\frac{1}{8}$–$\frac{1}{4}$ in. long, ovate or oblong, nearly flat on both surfaces, green above, paler beneath; young ones growing from one side but soon becoming disconnected. Spathe unequally 2-lipped. Stamens 2, appearing successively (each a distinct male flower). Style rather long. Seed horizontal, hemi-anatropal, albuminous.—*Hook. f. Fl. Nov. Zel.* i (1853) 239; *Handb. N.Z. Fl.* (1864) 278; *Benth. Fl. Austral.* vii (1878) 163; *Hegelm. Lemn.* (1868) 142, t. 9, 10.

North and South Islands: Still waters, abundant throughout. Sea-level to 2000 ft. *Duckweed.* Almost cosmopolitan in its distribution.

Ex ? 2. **L. gibba** *Linn. Sp. Plant.* (1753) 970.—Root solitary, the sheath at its base elongate, cylindric, rootcap acute. Frond symmetrical, $\frac{1}{4}$–$\frac{1}{3}$ in. long, thick and spongy, flat above, convex beneath; young ones growing from one side, but soon separating. Spathe sac-like. Stamens 2. Ovules 2 or more. Utricle bursting transversely. Seeds erect, anatropous; albumen scanty or wanting.—*Hook. f. Fl. Nov. Zel.* i (1853) 239; *Handb. N.Z. Fl.* (1864) 278; *Benth. Fl. Austral.* vii (1878) 163; *Hegelm. Lemn.* (1868) 145, tt. 11–13.

North Island: Poverty Bay, *Colenso.*

I have seen no New Zealand specimens of this species, which is almost as widely distributed as *L. minor.* It is recognized at a glance by the conspicuously tumid under-surface of the frond.

RESTIONACEAE

Family XVI. **RESTIACEAE.**

Sedge-like or rush-like perennial herbs, either tufted or with a creeping rhizome usually covered with imbricated scales. Stems rigid, simple or branched, erect or flexuose. Leaves either few, radical, linear and sedge-like, or more often nearly or altogether reduced to convolute scales sheathing the stem; sheaths usually split to the base. Flowers dioecious, very rarely hermaphrodite, in spikes or racemes or panicles, each flower furnished at the base with a dry and rigid bract (glume) and sometimes 2 bracteoles. Perianth regular, of 6, rarely more or less, rigid or scarious erect segments. Male flowers: Stamens 3; filaments free or rarely connate into a colmun; anthers oblong, usually 1-celled. Rudimentary ovary occasionally present. Female flowers: Staminodia present or absent. Ovary 1–3-celled; styles as many as the cells, free or connate at the base,

stigmatic on the inner side; ovules solitary in each cell, pendulous, orthotropous. Fruit either a 1–3-celled capsule with longitudinal dehiscence or an indehiscent nut. Seeds 1 in each cell, pendulous, albumen farinaceous; embryo small, remote from the hilum.

A small order of about 20 genera and 230 species, almost confined to South Africa and Australia, the only species found outside these countries being the three occurring in New Zealand, one in Chile, and one in Cochin-China. The species have no important uses or properties.

Spikelets many-flowered, panicled. Ovary 3-celled. Fruit 3-angled, dehiscing at the angles	1. LEPYRODIA.
Spikelets many-flowered, panicled. Ovary 1-celled. Nut 3-angled, indehiscent	2. LEPTOCARPUS.
Spikelets few-flowered, female 1-flowered. Ovary 1-celled. Nut ovoid, terete, smooth	3. HYPOLAENA.

SPORADANTHUS F. Muell. ex Benth. Trans. 6:1874:340 & 10:44.41

1. LEPYRODIA R. Br. 1810

Rhizome stout, creeping, scaly. Stems erect, simple or branched, terete. Leaves reduced to persistent or rarely deciduous sheathing scales. Flowers dioecious or monoecious, rarely hermaphrodite, in rather broad or narrow panicles, sometimes almost spicate, the inflorescence not conspicuously different in the two sexes. Glumes lanceolate, scarcely imbricate; bracteoles 2 at the base of each flower. Male flowers: Perianth-segments 6, glume-like or thin and almost hyaline. Stamens 3; filaments distinct; anthers 1-celled. Female flowers: Perianth as in the males. Staminodia 3, sometimes with abortive anthers. Ovary 3-angled, 3-celled; styles 3, free or connate at the base; ovules 1 in each cell. Capsule triquetrous, dehiscing at the angles.

1. **L. Traversii** *F. Muell. Fragm.* viii (1873) 79.—Rhizome stout, creeping, clothed with pale-chestnut scales; roots long, stringy. Stems stout, terete, polished, simple below, fastigiately branched above, 2–5 ft. high. Sheaths distant, closely appressed, acuminate, ¾–1 in. long. Inflorescence a rather narrow closely branched red-brown terminal panicle 2–5 in. long; branches erect, unequal; bracts under the branches rigid, lanceolate, acuminate. Flowers sessile or shortly pedicelled within lanceolate glumes rather longer than the perianth; 2 scarious bracteoles at the base of each flower. Perianth-segments in both sexes red-brown, lanceolate, acute; male flowers with a small rudimentary ovary, females with 3 slender staminodia. Anthers linear-oblong, minutely apiculate. Ripe fruit 1-celled, 1-seeded, obliquely ovoid, triquetrous with the angles thickened, tipped with the remains of the style, at length dehiscent along the angles.—*Cheesem. Man. N.Z. Fl.* (1906) 760; *Ill. N.Z. Fl.* ii (1914) t. 208. Calorophus sp. *Hook. f. Fl. Nov. Zel.* i (1853) 267. Sporadanthus Traversii *F. Muell. in Trans. N.Z. Inst.* vii (1875) 389; *T. Kirk ibid.* x (1878) App. 41.

III 340. See Trans 56:1926:84

NORTH ISLAND: Auckland — Peat swamps near the outlet of Lake Tongonge, near Kaitaia, *R. H. Matthews! H. Carse!* swamps between Hamilton and Ohaupo, *T. F. C., R. Calhoun!* CHATHAM ISLANDS: Abundant in peat bogs, *Dieffenbach, H. H. Travers! Cockayne!* November.

A very remarkable species. If differs from *Lepyrodia* in the 1-celled and 1-seeded fruit, and was consequently erected into a separate genus (*Sporadanthus*) by F. Mueller. In the "Genera Plantarum" Hooker and Bentham reduced *Sporadanthus* to *Lepyrodia*, suggesting that the ovary is 1-celled by abortion. But in young buds I can find no trace of the ovary being 3-celled, or of there being more than one ovule. I think that ultimately Mueller's view will be substantiated.

Kew Bull. 1940 p. 92.

2. LEPTOCARPUS R. Br. 1810

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Male ... m;
anthers 1-celled. Female ... dia
3 or none. Ovary 1-celled, triquetrous; styles ..., ...ry,
pendulous. Fruit narrow-ovoid, triquetrous, indehiscent or splitting down the angles.

Species about 25, one in New Zealand, one in Chile, another in Cochin-China, 7 in South Africa, the remainder confined to Australia.

(Mem.)

1. **L. simplex** *A. Rich. Fl. Nouv. Zel.* (1832) 142 (*not of R. Br.*).—Rhizome stout, creeping, clothed with chestnut-brown scales. Stems numerous, densely crowded, simple, slender, terete, rush-like, 1–5 ft. high. Sheaths closely appressed, blackish-brown, distant, 1½–4 in. apart. Male inflorescence panicled; panicles variable in size, sometimes long and slender, at other times short and contracted, alternate on the upper part of the stem. Spikelets numerous, sessile or pedicelled, red-brown, ¼–½ in. long, many-flowered. Glumes imbricate, ovate-lanceolate, acuminate, much longer than the flowers. Perianth-segments 4–6, lanceolate, the 3 inner rather smaller. Female inflorescence compacted into rounded or oblong often lobed or interrupted fascicles or glomerules, alternate along the stem. Glumes broadly ovate, acuminate. Perianth rather longer than in the males; segments 6, the 3 outer keeled, acuminate; the 3 inner flat, oblong, obtuse or mucronate. Fruit narrow-ovoid, triquetrous.—*A. Cunn. Precur.* (1836) n. 291; *Raoul Choix* (1846) 40; *Hook. f. Fl. Nov. Zel.* i (1853) 265, t. 61; *Handb. N.Z. Fl.* (1864) 294; *Cheesem. Man. N.Z. Fl.* (1906) 761. Restio simplex *Murr. Syst. Veg.* v (1744) 882; *Forst. f. Prodr.* (1786) n. 367.

Ed. 13 — 725 (1784)

North and South Islands, Stewart Island, Chatham Islands: Salt marshes and sandy shores, abundant. Also inland near hot springs at Rotorua and at Tokaanu (Lake Taupo). *Oioi.* September–December.

CALOROPHUS Labill. Pl. Nov. Holl. ii (1806) 78 t. 228

3. **HYPOLAENA** R. Br. 1810 Kew Bull 1940 p. 92

Stems slender, much branched, often flexuous. Leaves reduced to persistent sheathing scales. Flowers dioecious, in spikelets with imbricate glumes and no bracteoles; the male spikelets few- or many-flowered, rarely 1-flowered, solitary or 2 together along the branchlets, or several in a terminal panicle; the females 1-flowered, either solitary or 2–3 together near the tips of the branches. Male flowers: Perianth-segments 6, narrow, thin. Stamens 3; filaments filiform; anthers 1-celled. Female flowers: Perianth-segments 6, smaller than in the males, very thin, almost hyaline. Staminodia when present 3. Ovary 1-celled; style-branches 2 or 3, filiform; ovule solitary, pendulous. Fruit an ovoid or obovoid terete indehiscent 1-seeded nut.

A genus consisting of about 25 species natives of South Africa, and 5 found in Australia, one of the latter extending to New Zealand.

but

see Hutchinson Fams. II p. 193: Hypolaena is conserved in Int. Rules

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RESTIACEAE

Fruit indehiscent . . . . . Calorophus
" dehiscent . . . . . .
Glumes hardly imbricate , Lepyrodia
" imbricate . . . , Leptocarpus

Key to genera.

Spikelets many-flowered, paniculed. Ovary 3-celled. Fruit 3-angled, dehiscing at the angles	1. LEPYRODIA.
Spikelets many-flowered, paniculed. Ovary 1-celled. Nut 3-angled, indehiscent	2. LEPTOCARPUS.
Spikelets few-flowered, female 1-flowered. Ovary 1-celled. Nut ovoid, terete, smooth	3. HYPOLAENA.

SPORADANTHUS F. Muell. Fragm. Trans. 6:1874:340
4 10 : 44. 41

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III 340. see Trans 56 : 1926 : 84

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A very remarkable species. If differs from *Lepyrodia* in the 1-celled and 1-seeded fruit, and was consequently erected into a separate genus (*Sporadanthus*) by F. Mueller. In the "Genera Plantarum" Hooker and Bentham reduced *Sporadanthus* to *Lepyrodia*, suggesting that the ovary is 1-celled by abortion. But in young buds I can find no trace of the ovary being 3-celled, or of there being more than one ovule. I think that ultimately Mueller's view will be substantiated.

2. LEPTOCARPUS R. Br. 1810

Stems simple or branched, terete, erect from a stout creeping scaly rhizome. Leaves reduced to persistent sheathing scales. Flowers dioecious, the spikelets with imbricate glumes with or without bracteoles, the male and female inflorescences alike or dissimilar, sometimes both sexes have the spikelets arranged in panicles, sometimes the male spikelets are pedicelled and paniculate, and the females sessile and fascicled or spicate. Male flowers: Perianth-segments 6. Stamens 3; filaments filiform; anthers 1-celled. Female flowers: Perianth as in the males. Staminodia 3 or none. Ovary 1-celled, triquetrous; styles 3, filiform; ovule solitary, pendulous. Fruit narrow-ovoid, triquetrous, indehiscent or splitting down the angles.

Species about 25, one in New Zealand, one in Chile, another in Cochin-China, 7 in South Africa, the remainder confined to Australia.

1. **L. simplex** *A. Rich. Fl. Nouv. Zel.* (1832) 142 (*not of R. Br.*).—Rhizome stout, creeping, clothed with chestnut-brown scales. Stems numerous, densely crowded, simple, slender, terete, rush-like, 1–5 ft. high. Sheaths closely appressed, blackish-brown, distant, 1½–4 in. apart. Male inflorescence panicled; panicles variable in size, sometimes long and slender, at other times short and contracted, alternate on the upper part of the stem. Spikelets numerous, sessile or pedicelled, red-brown, ¼–½ in. long, many-flowered. Glumes imbricate, ovate-lanceolate, acuminate, much longer than the flowers. Perianth-segments 4–6, lanceolate, the 3 inner rather smaller. Female inflorescence compacted into rounded or oblong often lobed or interrupted fascicles or glomerules, alternate along the stem. Glumes broadly ovate, acuminate. Perianth rather longer than in the males; segments 6, the 3 outer keeled, acuminate; the 3 inner flat, oblong, obtuse or mucronate. Fruit narrow-ovoid, triquetrous.—*A. Cunn. Precur.* (1836) n. 291; *Raoul Choix* (1846) 40; *Hook. f. Fl. Nov. Zel.* i (1853) 265, t. 61; *Handb. N.Z. Fl.* (1864) 294; *Cheesem. Man. N.Z. Fl.* (1906) 761. Restio simplex *Murr. Syst. Veg.* v (1744) 882; *Forst. f. Prodr.* (1786) n. 367.

North and South Islands, Stewart Island, Chatham Islands: Salt marshes and sandy shores, abundant. Also inland near hot springs at Rotorua and at Tokaanu (Lake Taupo). *Oioi.* September–December.

3. HYPOLAENA R. Br. 1810

Stems slender, much branched, often flexuous. Leaves reduced to persistent sheathing scales. Flowers dioecious, in spikelets with imbricate glumes and no bracteoles; the male spikelets few- or many-flowered, rarely 1-flowered, solitary or 2 together along the branchlets, or several in a terminal panicle; the females 1-flowered, either solitary or 2–3 together near the tips of the branches. Male flowers: Perianth-segments 6, narrow, thin. Stamens 3; filaments filiform; anthers 1-celled. Female flowers: Perianth-segments 6, smaller than in the males, very thin, almost hyaline. Staminodia when present 3. Ovary 1-celled; style-branches 2 or 3, filiform; ovule solitary, pendulous. Fruit an ovoid or obovoid terete indehiscent 1-seeded nut.

A genus consisting of about 25 species natives of South Africa, and 5 found in Australia, one of the latter extending to New Zealand.

C. lateriflorus (R.Br.) F.v.M.

1. **H. lateriflora** *Benth. Fl. Austral.* vii (1878) 238. — Stems slender, much branched, flexuose and often interlacing, usually from 9–18 in., but sometimes forming dense masses 2–3 ft. high. Sheaths $\frac{1}{5}$–$\frac{1}{3}$ in. long, closely appressed, often ciliate at the mouth, with a short subulate spreading tip. Male spikelets 1 or 2 together in the upper sheaths, each spikelet 3–6-flowered; glumes rather thin, rigid, tip acute. Perianth-segments 6, very narrow-linear, acute. Stamens 3; anthers linear-oblong. Female spikelets solitary within the uppermost sheaths, 1–3-flowered. Perianth-segments 6 or 4, very small, the inner not much longer than the ovary, broadly ovate, thin and hyaline. Style-branches 3. Nut broadly ovoid, terete, with a thick and swollen base.—*Cheesem. Man. N.Z. Fl.* (1906) 761. Calorophus elongatus *Lab. Pl. Nov. Holl.* ii (1806) 78, t. 228 (*in part*); *Hook. f. Fl. Nov. Zel.* i (1853) 267; *Handb. N.Z. Fl.* (1864) 297.

Var. **minor** *Hook. f. Handb. N.Z. Fl.* (1864) 297.—Much smaller and more slender, sometimes only a few inches high. Male spikelet solitary, 2–3-flowered; female usually 1-flowered.—Calorophus minor *Fl. Nov. Zel.* i (1853) 267.

North and South Islands, Stewart Island, Chatham Islands: The typical form not uncommon in lowland swamps in the North Island, from the North Cape southwards; var. *minor* abundant in mountain districts throughout. Sea-level to 5500 ft. November–March.

Also an abundant Australian and Tasmanian plant. The var. *minor* passes insensibly into the ordinary form.

see Pl. Hamiltonian. 15a. p. 32. 1930.

Family XVII. **CENTROLEPIDACEAE.**

Annual or perennial tufted often moss-like plants, of small size. Leaves linear or setaceous, either all radical or densely imbricated on the short stems and branches. Flowers very small, usually hermaphrodite, one or several within 1–3 bracts, forming little heads or spikelets terminating short scapes or peduncles. Bracteoles or glumes under each flower 1–3, hyaline, sometimes wanting. Perianth none. Stamens 1–2; filaments filiform; anthers versatile, 1-celled. Ovary either 1-celled, or with 2–3 collateral cells, or of 2 or more free or irregularly connate carpels superposed in 2 rows; ovules solitary and pendulous in each cell or carpel; styles as many as the cells or carpels; stigmas linear. Fruit small, dry, pericarp membranous, the cells or carpels opening extrorsely by a longitudinal slit. Seed pendulous or laterally affixed; albumen farinaceous; embryo minute.

A small and inconspicuous order, comprising 4 or 5 genera and about 35 species. With the exception of the New Zealand species, one found in China, and one in antarctic South America, the order is confined to Australia. It has no properties of importance.

Flowers crowded in terminal heads enclosed within 2–5 bracts; heads unisexual .. .. 1. Hydatella.
Flowers within 2 alternate bracts, 1–5 within each bract. Stamen 1. Ovary of 3 or more carpels superposed in 2 rows (rarely reduced to 1) .. .. 2. Centrolepis.
Flowers within 2–3 alternate bracts, 1 or rarely 2 within each bract. Stamen 1 to each flower. Ovary of 2 collateral cells or carpels .. 3. Gaimardia.

1. **HYDATELLA** Diels. 1904

Minute tufted and stemless annual herbs. Leaves numerous, all radical, filiform. Scapes usually numerous, radical, shorter than the leaves, each bearing a terminal head of minute flowers enclosed within 2–5 bracts; heads unisexual. Bracts usually 2 in the Australian species, 3–5 in the New

Zealand. Male flowers: Stamens with a filiform filament and a 2-celled oblong anther. Female flowers: Ovaries densely crowded within the bracts, numerous, oblong or ovoid, not angled nor compressed, 1-celled and 1-ovuled; styles numerous, filiform, elongated, unequal in length. Fruit oblong or elliptic-ovoid, apparently indehiscent.

A genus of three species; two found in West Australia, the third endemic in New Zealand. It is closely allied to *Juncella* F. Muell. (*Trithuria* Hook. f.), but differs in the inflorescence being monoecious, in the stipitate flowers, in the longer and more numerous styles, and in the bracts being usually 3–5.

1. **H. inconspicua** *Cheesem. in Trans. N.Z. Inst.* xxxix (1907) 433.—A very minute slender perfectly glabrous annual herb, forming dense moss-like tufts ½–1 in. high. Leaves numerous, all radical, filiform, strict, erect, terete, gradually tapering to an acute point. Scapes very short in the flowering stage, lengthening to ½ or ¾ the length of the leaves when in fruit. Bracts 3–5, erect or erecto-patent, linear-lanceolate to ovate-lanceolate, acute, thin and membranous, $\frac{1}{12}$–$\frac{1}{8}$ in. long. Heads unisexual; males not seen. Ovaries densely crowded within the bracts, usually from 10 to 20, shortly stipitate, ovoid or oblong-ovoid, smooth, pale yellow-brown or reddish. Styles numerous, very delicate, forming a spreading brush at the tip of the ovary, and often much longer than it. Ripe fruit elliptic-ovoid, pale yellow-brown with a dark spot at each end.—Trithuria inconspicua *Man. N.Z. Fl.* (1906) 754.

North Island: Auckland—Sandy shores of Lake Ngatu, coast north of Ahipara, North Cape district, *H. Carse* and *R. H. Matthews!* Lake Rotoroa, in the same district, *H. B. Matthews!*

A very curious and remarkable little plant, so far only known from the locality quoted above. It is clearly congeneric with the two Australian species, which have been excellently described and figured by Dr. Diels in his "Fragmenta Phytographiae Australiae Occidentalis," but differs from them in the stricter and more densely tufted habit, and more numerous bracts.

2. **CENTROLEPIS** Labill.

Small tufted annual or perennial herbs. Leaves all radical or imbricating along the stems, linear or filiform. Scape slender, terminating in 2 floral bracts which are either subopposite or one a little above the other. Flowers hermaphrodite, sessile, from 1 to 5 within each bract; each flower with 1–3 hyaline scales, or rarely the scales altogether wanting. Stamen 1; filament very long, filiform; anther linear-oblong, 1-celled. Carpels from 3–8 (sometimes reduced to 1), connate and superposed in 2 rows; styles as many as the carpels, filiform, free or connate at the base. Fruiting-carpels with a membranous pericarp, longitudinally dehiscent.

A small genus of between 20 and 30 species, all confined to Australia, except one found in Cambodia, and the New Zealand plant, which is much more widely distributed in Australia than in New Zealand.

1. **C. strigosa** *Roem and Schult. Syst.* i (1817) 43.—A slender tufted annual herb 1–2 in. high. Leaves all radical, much shorter than the scapes, expanded into a broad membranous sheathing base below, above very narrow-linear or filiform, hispid throughout with short spreading hairs. Scapes radical, slender, hispid like the leaves. Floral bracts 2, close together, ovate, awned at the tip, concave, spreading, hispid with long hairs. Flowers from 3 to 8 within each bract, each flower with 3 hyaline scales, the scales unequal in length, the largest one usually as long as the bract, the others

shorter. Stamen 1, exserted. Carpels from 3 to 8 in each flower, superposed and connate in 2 rows; styles as many as the carpels, free almost to the base.—*Benth. Fl. Austral.* vii (1878) 207; *T. Kirk in Trans. N.Z. Inst.* xxiii (1891) 442; *Cheesem. Man. N.Z. Fl.* (1906) 756.

SOUTH ISLAND: Otago—Bluff Hill, *T. Kirk! H. J. Matthews!* December–January.

A common Australian and Tasmanian plant.

3. GAIMARDIA Gaud. 1826.

Densely tufted perennial herbs, forming moss-like patches in subalpine bogs. Stems much branched, leafy throughout. Leaves numerous, densely imbricated, linear or linear-subulate or setaceous, erect, dilated at the base into broad membranous sheaths. Scape terminal, shorter or slightly longer than the leaves. Floral bracts 2 or 3, when 3 the upper one usually empty. Flowers 1, or more rarely 2 to each bract. Stamen 1 to each flower, sometimes deficient in one of the flowers. Ovary 2-celled or more rarely 3-celled, the cells (or carpels) collateral, connate; styles the same number as the carpels, long, filiform. Fruiting carpels 2, or 1 by abortion.

In my memoir on the botany of the Subantarctic islands of New Zealand I have transferred to *Gaimardia* three plants (*G. ciliata*, *G. pallida*, and *G. minima*) placed by Kirk in *Centrolepis*. As pointed out in the first edition of this work, they differ in the perennial densely pulvinate habit, the shape of the leaves, the flowers seldom more than 1 in each floral bract, and in the cells of the ovary (or carpels) being frequently reduced to 1. In the "Pflanzenfamilien" Hieronymus keeps up the genus *Alepyrum* for their reception, a course which is likely to lead to confusion, seeing that not one of the species which R. Brown placed in the original genus *Alepyrum* is retained in it by Hieronymus. Until the whole family receives a careful examination it is best to leave the species in *Gaimardia*.

As now constituted *Gaimardia* is a genus containing 5 species, 4 of which are natives of New Zealand, the remaining 1 being endemic in Fuegia.

1. *Glabrous.*	
Minute; stems $\frac{1}{4}$–$\frac{1}{2}$ in. high. Carpels 2–5 to each flower ..	1. *G. minima.*
Larger; stems $\frac{3}{4}$–1 in. high, forming compact patches. Carpels 1–3 to each flower	2. *G. pallida.*
Forming broad patches 1–3 ft. across. Leaves with acicular tips. Carpels 1–2 to each flower	3. *G. setacea.*
2. *Sheaths densely ciliate.*	
Forming patches 1–4 ft. across and often 2 in. thick. Carpels usually 1 to each flower	4. *G. ciliata.*

1. **G. minima**, *Cheesem.* — A minute glabrous densely tufted plant, forming flat moss-like patches. Stems very short, $\frac{1}{4}$–$\frac{1}{2}$ in. high. Leaves equalling or rather shorter than the scapes, distichous, linear-subulate, dilated into broad equitant membranous sheaths at the base. Scape short, stout. Floral bracts 2, opposite, ovate, erect, the outer one shortly awned. Flowers 1 to each bract, one of them with a stamen, the other usually without, filament very long. Hyaline scales wanting. Carpels from 2 to 5 to each flower, connate in 2 rows; styles as many as the carpels, connate at the base.—Centrolepis minima *T. Kirk in Trans. N.Z. Inst.* xxiii (1891) 441; *Cheesem. Man. N.Z. Fl.* (1906) 757.

SOUTH ISLAND: Westland—Shores of Lake Brunner, *T. Kirk!* Otago—Lake Te Anau, *Petrie!* January–March.

Very closely allied to *G. pallida*, but a smaller, stiffer plant, with more numerous carpels to the flowers.

Alepyrum pallidum etc

2. **G. pallida** *Hook. f. Fl. Antarct.* i (1844) 86.—Forming pale-green cushion-shaped masses. Stems short, densely packed, $\frac{1}{2}$–$1\frac{1}{2}$ in. high, leafy throughout. Leaves closely imbricate, distichous, $\frac{1}{6}$–$\frac{1}{3}$ in. long; sheaths $\frac{1}{2}$ the length of the leaf or more, white and transparent, membranous, glabrous; lamina laterally compressed, ensiform-lanceolate or subulate, acute. Scape terminal, usually shorter than the leaves. Floral bracts 2, close together, unequal, the lower one the largest. Flowers 2, the upper one always with a stamen, the lower one frequently without; filament very long, the anther far-exserted. Ovary of 1–3 (rarely 4) superimposed and connate carpels; styles as many as the carpels, connate at the base.—Alepyrum pallidum *Fl. Nov. Zel.* i (1853) 268, t. 62c; *Handb. N.Z. Fl.* (1864) 296. Centrolepis pallida *Cheesem. Man. N.Z. Fl.* (1906) 757.

NORTH ISLAND: Boggy places near the base of Tongariro and Ruapehu, *T. F. C., Cockayne;* Ruahine Mountains, *Colenso.* SOUTH ISLAND: Otago—Maungatua, Mount Kyeburn, Clinton Valley, Blue Mountains, *Petrie!* CAMPBELL ISLAND: *Hooker, T. Kirk! R. M. Laing!* December–March.

3. **G. setacea** *Hook. f. Fl. Nov. Zel.* i (1853) 267.—Perennial, densely tufted and compacted, forming broad moss-like patches sometimes 1–3 ft. across. Stems very numerous, branched, erect, leafy throughout, 1–3 in. high. Leaves numerous, erect, densely imbricate, $\frac{1}{4}$–$\frac{3}{4}$ in. long, linear-setaceous with acicular tips; sheaths broad, membranous, quite glabrous, entire, produced at the tip into a free ligule. Scape terminal, rigid, erect, longer than the leaves. Floral bracts 2 or 3, alternate, convolute, appressed

CENTROLEPIDACEAE (after Hutchinson)

. Perennial, with tufted branches, moss-like . 2
  Annual, with radicle leaves, scapigerous . .3
. Stamens 2, fls. actinomorphic . . . Gaimardia
  Stamen 1, fls. zygomorphic . . . . Alepyrum
. Anthers 2-celled, fls.in a head . . Juncella
  Anthers 1-celled, fls. within 2 bracts
  . . . . . centrolepis
  (after Gilg - Benedict)
. Antherea dithecisch . . . . . hydatella
  Antherea monothecisch 2
. Einigahrige, grundstandigen Blattun . . . .
  . . . . . centrolepis
  Mehrjahrige, Rasen bildend 3
. Bluten unregelmassig, oder eingard . . .
  . . . . . Alepyrum
  Bluten regelmassig, 2 zahlig . . Gaimardia

(Hutchinson unites Hydatella with Juncella)

1. 619.

Centrolepis pilulifera (Hook. f.) Druce
1911 1 614.

Pseudalepyrum Dandy (Journ. Bot. lxx 33. 1932)
also Lemée Dict Pl. Phan. V. 579 (1934)

shorter. Stamen 1, exserted. Carpels from 3 to 8 in each flower, superposed and connate in 2 rows; styles as many as the carpels, free almost to the base.—*Benth. Fl. Austral.* vii (1878) 207; *T. Kirk in Trans. N.Z. Inst.* xxiii (1891) 442; *Cheesem. Man. N.Z. Fl.* (1906) 756.

South Island: Otago—Bluff Hill, *T. Kirk! H. J. Matthews!* December–January.

A common Australian and Tasmanian plant.

Alepyrum Haeckel (Linn. R. Bot.) Akad. d. Naturf. Leop. Carol. Ges. Halle 13: 212, 1877.

3. GAIMARDIA Gaud. 1826.

Densely tufted perennial herbs, forming moss-like patches in subalpine bogs. Stems much branched, leafy throughout. Leaves numerous, densely imbricated, linear or linear-subulate or setaceous, erect, dilated at the base into broad membranous sheaths. Scape terminal, shorter or slightly longer than the leaves. Floral bracts 2 or 3, when 3 the upper one usually empty. Flowers 1, or more rarely 2 to each bract. Stamen 1 to each flower, sometimes deficient in one of the flowers. Ovary 2-celled or more rarely 3-celled, the cells (or carpels) collateral, connate; styles the same number as the carpels, long, filiform. Fruiting carpels 2, or 1 by abortion.

In my memoir on the botany of the Subantarctic islands of New Zealand I have transferred to *Gaimardia* three plants (*G. ciliata*, *G. pallida*, and *G. minima*) placed by Kirk in *Centrolepis*. As pointed out in the first edition of this work, they differ in the perennial densely pulvinate habit, the shape of the leaves, the flowers seldom more than 1 in each floral bract, and in the cells of the ovary (or carpels) being frequently reduced to 1. In the "Pflanzenfamilien" Hieronymus keeps up the genus *Alepyrum* for their reception, a course which is likely to lead to confusion, seeing that not one of
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2. **G. pallida** *Hook. f. Fl. Antarct.* i (1844) 86.—Forming pale-green cushion-shaped masses. Stems short, densely packed, ½–1½ in. high, leafy throughout. Leaves closely imbricate, distichous, ⅙–⅓ in. long; sheaths ½ the length of the leaf or more, white and transparent, membranous, glabrous; lamina laterally compressed, ensiform-lanceolate or subulate, acute. Scape terminal, usually shorter than the leaves. Floral bracts 2, close together, unequal, the lower one the largest. Flowers 2, the upper one always with a stamen, the lower one frequently without; filament very long, the anther far-exserted. Ovary of 1–3 (rarely 4) superimposed and connate carpels; styles as many as the carpels, connate at the base.—Alepyrum pallidum *Fl. Nov. Zel.* i (1853) 268, t. 62c; *Handb. N.Z. Fl.* (1864) 296. Centrolepis pallida *Cheesem. Man. N.Z. Fl.* (1906) 757.

North Island: Boggy places near the base of Tongariro and Ruapehu, *T. F. C., Cockayne;* Ruahine Mountains, *Colenso.* South Island: Otago—Maungatua, Mount Kyeburn, Clinton Valley, Blue Mountains, *Petrie!* Campbell Island: *Hooker, T. Kirk! R. M. Laing!* December–March.

3. **G. setacea** *Hook. f. Fl. Nov. Zel.* i (1853) 267.—Perennial, densely tufted and compacted, forming broad moss-like patches sometimes 1–3 ft. across. Stems very numerous, branched, erect, leafy throughout, 1–3 in. high. Leaves numerous, erect, densely imbricate, ¼–¾ in. long, linear-setaceous with acicular tips; sheaths broad, membranous, quite glabrous, entire, produced at the tip into a free ligule. Scape terminal, rigid, erect, longer than the leaves. Floral bracts 2 or 3, alternate, convolute, appressed, obtuse, each 1-flowered or the uppermost empty. Hyaline scales absent. Stamens 2. Ovary of 2 connate collateral carpels; style 1 to each carpel, filiform. Fruiting carpels 2, or 1 by abortion.—*Handb. N.Z. Fl.* (1864) 297; *Cheesem. Man. N.Z. Fl.* (1906) 758.

South Island, Stewart Island: Not uncommon in mountain bogs throughout. 2500–4500 ft. December–March.

4. **G. ciliata** *Hook. f. Fl. Antarct.* i (1844) 85.—Forming soft green cushions in subalpine bogs sometimes several feet in diam. and 1–2 in. thick or more. Stems very densely compacted, erect, branched, leafy throughout. Leaves numerous, erect, imbricating, with broad scarious sheathing bases, ¼–½ in. long, linear-subulate, channelled in front or terete, tip obtuse or acute, sheaths and sometimes the lower part of the lamina more or less clothed with soft white hairs. Scape terminal, usually exceeding the leaves. Floral bracts 2, alternate but close together, jointed at the base, the lower one with an obtuse often hooked point. Flowers 1 or more rarely 2 to each bract, each flower with a hyaline scale almost as long as the bract. Stamen 1, sometimes deficient in one of the flowers; filament very long. Carpel usually solitary, sometimes 2 connate in the lower flower; style 1 to each carpel, long, filiform.—*Handb. N.Z. Fl.* (1864) 295. Centrolepis monogyna *T. Kirk in Journ. Linn. Soc.* xix (1882) 286. C. viridis *T. Kirk in Trans. N.Z. Inst.* xxiii (1891) 441; *Cheesem. Man. N.Z. Fl.* (1906) 758.

Var. **ligulata** *T. Kirk l.c.* 442.—More slender than the type. Leaves ½–¾ in. long, spreading, filiform, with larger sheaths, which are marginate, the upper part of the margin forming a kind of ligule.

North Island: Base of Ruapehu, *Petrie! T. F. C., Cockayne;* Kaimanawa Mountains, *B. C. Aston;* Tararua Mountains, *Petrie.* South Island: Common in subalpine bogs throughout. Stewart Island, Auckland and Campbell Islands: Abundant in boggy places in open situations. Usually from 2000 to 5000 ft., but descends to sea-level in Stewart Island and in the Subantarctic islands. Var. *ligulata:* Stewart Island, near Fraser Peaks.

Family XVIII. **JUNCACEAE.**

Perennial, rarely annual herbs. Rootstock short, stout, scaly. Stems usually simple, slender, stiff, erect, cylindrical or compressed, sometimes septate within. Leaves usually all radical, often rigid and terete like the stems, sometimes flat and grassy, occasionally absent or reduced to sheaths. Flowers small, green or brown, regular, hermaphrodite or more rarely unisexual, in axillary or terminal cymes or clusters, rarely solitary. Perianth inferior, coriaceous or scarious, persistent; segments 6 in 2 series, imbricate. Stamens usually 6, inserted on the bases of the perianth-segments, the 3 interior sometimes wanting; filaments free, flattened or filiform; anthers 2-celled, introrse. Ovary superior, 1-celled or 3-celled; style short or long; stigmas 3, filiform; ovules few or many, anatropous. Fruit a 1- or 3-celled capsule, loculicidally 3-valved. Seeds few or many, erect; testa membranous, often lax at each end; albumen copious, fleshy; embryo minute.

If restricted to the true *Junceae*, this is a family of moderate size, comprising 7 or 8 genera and about 280 species. The two typical genera (*Juncus* and *Luzula*) are widely dispersed, especially in temperate and extratropical regions. The species have no important properties, and cannot be said to possess any economic value.

Glabrous. Flower solitary. Ovary 1-celled, ovules many. Style long	1. Rostkovia.
Glabrous. Flowers several or numerous. Ovary often 3-celled, ovules many. Style short	2. Juncus.
Hairy. Flowers several or numerous. Ovary 1-celled, ovules 3. Style short	3. Luzula.

see Pfl. fam. 15a : 219.

1. **ROSTKOVIA** Desv. 1808

Densely tufted perennial herbs. Rhizome short, horizontal, branched. Stems crowded on the rhizome, strict, erect, terete. Leaves 1 or more, together with several sheathing scales at the base of the stem. Flowers large, solitary, terminal; bracts at the base 1–3, the lowest one sometimes foliaceous. Perianth-segments 6, glumaceous, distinct, linear-subulate or linear-lanceolate, erect, rigid; margins often scarious. Stamens 6; filaments very short; anthers linear, erect, basifixed. Ovary sessile, 1-celled, with 3 parietal placentas; style stout, subulate, divided above into 3 linear stigmas; ovules numerous, anatropous. Seeds small; testa appendiculate or not; embryo very small, included in the base of the fleshy albumen.

A small genus of 4 species confined to New Zealand and antarctic South America.

Flowers $\frac{1}{4}$ in. long, exceeded by a foliaceous bract. Capsule longer than the perianth. Seeds not tailed	1. *R. magellanica.*
Flowers $\frac{3}{4}$ in. long; bract very short. Capsule not more than $\frac{1}{2}$ as long as the perianth. Seeds tailed	2. *R. gracilis.*

Rostkovia Perianth-segments equal, seeds obovoid.

Marsippospermum Perianth-segments unequal, seeds pointed at each end.

1. **R. magellanica** *Hook. f. Fl. Antarct.* i (1844) 81.—Perennial, densely tufted. Stems many, crowded, erect, terete, 4–9 in. high. Leaves several, equalling or exceeding the stems, sheathing at the base, erect, rigid, pungent, polished, channelled in front. Flower solitary, terminal, $\frac{1}{4}$ in. long; bracts 2, the lower foliaceous, twice as long as the flower or more, upper small, scarcely equalling the flower. Perianth-segments nearly equal, linear-oblong, acute. Stamens shorter than the segments; filaments linear; anthers longer than the filaments, connective unguiculate. Capsule large, equalling or exceeding the perianth, ovoid-globose, mucronate, hard and almost woody, dark-chestnut, smooth and shining. Seeds obovoid, inappendiculate.—*Handb. N.Z. Fl.* (1864) 291; *Buchen. Monog. Junc.* (1890) 70; *Pflanzenr.* Heft 25 (1906) 40. R. sphaerocarpa *Desv. in Journ. Bot.* i (1808) 234; *Cheesem. Man. N.Z. Fl.* (1906) 722. Juncus magellanicus *Lam. Encycl.* iii (1789) 266.

Auckland and Campbell Islands: Mossy and springy places on the hills, *Hooker, B. C. Aston!*

Also recorded from Fuegia, the Falkland Islands, and South Georgia, and said to have been gathered on the Andes of Quito at an elevation of 13000 ft. It is included in Armstrong's list of Canterbury plants (Trans. N.Z. Inst. xii (1880) 344), but, I believe, erroneously.

2. **R. gracilis** *Hook. f. Fl. Antarct.* i (1844) 83, t. 47.—Perennial, densely tufted. Rhizome stout, horizontal or inclined. Stems numerous, crowded, erect, terete, smooth, 6–12 in. high, base with several pale or dark fulvous sheaths. Leaves 1–3, from slightly longer to 2 or even 3 times as long as the stems, slender, terete, rigid, grooved in front. Flower large, solitary, terminal, $\frac{1}{2}$–$\frac{3}{4}$ in. long; bract solitary, very small, $\frac{1}{10}$ in. long, entire or 2-lobed. Perianth-segments linear-subulate, pale-chestnut, shining, the inner conspicuously shorter. Stamens 6, much shorter than the segments; filaments very short, broad and flat; anthers linear, 3 or 4 times as long as the filaments, connective unguiculate. Capsule about $\frac{1}{3}$ in. long, narrow ovoid-oblong, obtusely trigonous, acute, chestnut-brown, coriaceous, smooth and shining, 3-valved. Seeds numerous, small, pale, produced at both ends into a long pearly-white appendage.—*Handb. N.Z. Fl.* (1864) 292; *Cheesem. Man. N.Z. Fl.* (1906) 722; *Ill. N.Z. Fl.* ii (1914) t. 203. R. novae-zealandiae *Buch. in Trans. N.Z. Inst.* iv (1872) 227, t. 16. Marsippospermum gracile *Buchen. in Abh. Nat. Ver. Brem.* vi (1879) 374; *Monog. Junc.* (1890) 68.

South Island: Not uncommon in alpine localities, especially in the central and western portions of the Island, usually between 4500–7000 ft. Auckland and Campbell Islands: Not uncommon in rocky places, 500–1200 ft. December–February.

Easily distinguished from the preceding species by the larger flower, relatively smaller capsule, and tailed seeds. Mr. Buchanan's *R. novae-zealandiae* was published in the belief that the Auckland Islands plant always had the leaves solitary and 2 or 3 times longer than the stems, but in point of fact both New Zealand and Auckland Islands specimens are variable in the number and length of the leaves.

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Family XVIII. JUNCACEAE.

Perennial, rarely annual herbs. Rootstock short, stout, scaly. Stems usually simple, slender, stiff, erect, cylindrical or compressed, sometimes septate within. Leaves usually all radical, often rigid and terete like the stems, sometimes flat and grassy, occasionally absent or reduced to sheaths. Flowers small, green or brown, regular, hermaphrodite or more rarely unisexual, in axillary or terminal cymes or clusters, rarely solitary. Perianth inferior, coriaceous or scarious, persistent; segments 6 in 2 series, imbricate. Stamens usually 6, inserted on the bases of the perianth-segments, the 3 interior sometimes wanting; filaments free, flattened or filiform; anthers 2-celled, introrse. Ovary superior, 1-celled or 3-celled; style short or long; stigmas 3, filiform; ovules few or many, anatropous. Fruit a 1- or 3-celled capsule, loculicidally 3-valved. Seeds few or many, erect; testa membranous, often lax at each end; albumen copious, fleshy; embryo minute.

If restricted to the true *Junceae*, this is a family of moderate size, comprising 7 or 8 genera and about 280 species. The two typical genera (*Juncus* and *Luzula*) are widely dispersed, especially in temperate and extratropical regions. The species have no important properties, and cannot be said to possess any economic value.

Glabrous. Flower solitary. Ovary 1-celled, ovules many. Style long .. .. 1. ROSTKOVIA.
Glabrous. Flowers several or numerous. Ovary often 3-celled, ovules many. Style short .. .. 2. JUNCUS.
Hairy. Flowers several or numerous. Ovary 1-celled, ovules 3. Style short .. .. 3. LUZULA.

See Pfl. fam. 15a : 219.

1. ROSTKOVIA Desv. 1808

Densely tufted perennial herbs. Rhizome short, horizontal, branched. Stems crowded on the rhizome, strict, erect, terete. Leaves 1 or more, together with several sheathing scales at the base of the stem. Flowers large, solitary, terminal; bracts at the base 1–3, the lowest one sometimes foliaceous. Perianth-segments 6, glumaceous, distinct, linear-subulate or linear-lanceolate, erect, rigid; margins often scarious. Stamens 6; filaments very short; anthers linear, erect, basifixed. Ovary sessile, 1-celled, with 3 parietal placentas; style stout, subulate, divided above into 3 linear stigmas; ovules numerous, anatropous. Seeds small; testa appendiculate or not; embryo very small, included in the base of the fleshy albumen.

A small genus of 4 species confined to New Zealand and antarctic South America.

Flowers $\frac{1}{4}$ in. long, exceeded by a foliaceous bract. Capsule longer than the perianth. Seeds not tailed .. .. .. 1. *R. magellanica.*
Flowers $\frac{3}{4}$ in. long; bract very short. Capsule not more than $\frac{1}{2}$ as long as the perianth. Seeds tailed .. .. .. 2. *R. gracilis.*

Buchenau confines the genus *Rostkovia* to *R. magellanica*, reviving Desvaux's name of *Marsippospermum* for the three remaining species. But Hooker and Bentham, in the "Genera Plantarum," point out that at present *Rostkovia* constitutes a natural and well-defined genus, easily distinguishable by habit alone, and that the differences relied upon by Buchenau to separate his two groups are in reality much less pronounced than those which divide well-known species of *Juncus*, as, for instance, *J. bufonius* and *J. acutus*.

1. **R. magellanica** *Hook. f. Fl. Antarct.* i (1844) 81.—Perennial, densely tufted. Stems many, crowded, erect, terete, 4–9 in. high. Leaves several, equalling or exceeding the stems, sheathing at the base, erect, rigid, pungent, polished, channelled in front. Flower solitary, terminal, $\frac{1}{4}$ in. long; bracts 2, the lower foliaceous, twice as long as the flower or more, upper small, scarcely equalling the flower. Perianth-segments nearly equal, linear-oblong, acute. Stamens shorter than the segments; filaments linear; anthers longer than the filaments, connective unguiculate. Capsule large, equalling or exceeding the perianth, ovoid-globose, mucronate, hard and almost woody, dark-chestnut, smooth and shining. Seeds obovoid, inappendiculate.—*Handb. N.Z. Fl.* (1864) 291; *Buchen. Monog. Junc.* (1890) 70; *Pflanzenr.* Heft 25 (1906) 40. R. sphaerocarpa *Desv. in Journ. Bot.* i (1808) 234; *Cheesem. Man. N.Z. Fl.* (1906) 722. Juncus magellanicus *Lam. Encycl.* iii (1789) 266.

AUCKLAND AND CAMPBELL ISLANDS: Mossy and springy places on the hills, *Hooker, B. C. Aston!*

Also recorded from Fuegia, the Falkland Islands, and South Georgia, and said to have been gathered on the Andes of Quito at an elevation of 13000 ft. It is included in Armstrong's list of Canterbury plants (Trans. N.Z. Inst. xii (1880) 344), but, I believe, erroneously.

2. **R. gracilis** *Hook. f. Fl. Antarct.* i (1844) 83, t. 47.—Perennial, densely tufted. Rhizome stout, horizontal or inclined. Stems numerous, crowded, erect, terete, smooth, 6–12 in. high, base with several pale or dark fulvous sheaths. Leaves 1–3, from slightly longer to 2 or even 3 times as long as the stems, slender, terete, rigid, grooved in front. Flower large, solitary, terminal, $\frac{1}{2}$–$\frac{3}{4}$ in. long; bract solitary, very small, $\frac{1}{10}$ in. long, entire or 2-lobed. Perianth-segments linear-subulate, pale-chestnut, shining, the inner conspicuously shorter. Stamens 6, much shorter than the segments; filaments very short, broad and flat; anthers linear, 3 or 4 times as long as the filaments, connective unguiculate. Capsule about $\frac{1}{3}$ in. long, narrow ovoid-oblong, obtusely trigonous, acute, chestnut-brown, coriaceous, smooth and shining, 3-valved. Seeds numerous, small, pale, produced at both ends into a long pearly-white appendage.—*Handb. N.Z. Fl.* (1864) 292; *Cheesem. Man. N.Z. Fl.* (1906) 722; *Ill. N.Z. Fl.* ii (1914) t. 203. R. novae-zealandiae *Buch. in Trans. N.Z. Inst.* iv (1872) 227, t. 16. Marsippospermum gracile *Buchen. in Abh. Nat. Ver. Brem.* vi (1879) 374; *Monog. Junc.* (1890) 68.

SOUTH ISLAND: Not uncommon in alpine localities, especially in the central and western portions of the Island, usually between 4500–7000 ft. AUCKLAND AND CAMPBELL ISLANDS: Not uncommon in rocky places, 500–1200 ft. December–February.

Easily distinguished from the preceding species by the larger flower, relatively smaller capsule, and tailed seeds. Mr. Buchanan's *R. novae-zealandiae* was published in the belief that the Auckland Islands plant always had the leaves solitary and 2 or 3 times longer than the stems, but in point of fact both New Zealand and Auckland Islands specimens are variable in the number and length of the leaves.

Pflan. fam. 15a : 214

2. **JUNCUS** Linn. 1735

Perennial or more rarely annual herbs; stems usually densely tufted. Leaves mostly or all radical, stout or slender, terete, compressed or flat, sometimes reduced to sheathing scales. Flowers small, hermaphrodite, in axillary or terminal fascicles or cymes or panicles. Perianth-segments 6, glumaceous, distinct, lanceolate or oblong, margins often scarious, the 3 outer often with the midrib keeled or thickened. Stamens 6 or rarely 3. Ovary more or less perfectly 3-celled, rarely 1-celled; ovules usually numerous in each cell; style divided to the middle into 3 linear stigmatic lobes. Capsule completely or incompletely 3-celled, 3-valved. Seeds small, ovoid or obovoid; testa minutely striate and reticulate.

A large genus of about 200 species, many of them widely distributed and some almost cosmopolitan. Of the 17 species found in New Zealand, 4 have a wide range, especially in the Northern Hemisphere; 9 extend to Australia and Tasmania, but not to any other countries; one stretches through Australia to eastern Asia and as far northwards as China and Japan; another occurs in antarctic South America; and 2 are endemic.

A. Genuini. *Stems tall, terete, produced beyond the cyme into an erect often pungent tip, base clothed with leafless sheaths. Leaves wanting, or rarely 1 or 2 terete like the stem.*

* Leaves wanting.

† Capsule conspicuously longer than the perianth, ovoid-trigonous.

Stems very tall and stout, 2–5 ft. × $\frac{1}{8}$–$\frac{1}{4}$ in. Flowers distinct in the cyme, not collected into separate groups. Stamens usually 6 — 1. *J. pallidus.*

Stems very slender, 9–24 in. × $\frac{1}{25}$–$\frac{1}{10}$ in. Cyme lax, flowers not very numerous, distinct in the cyme. Stamens 6–3 .. .. — 2. *J. pauciflorus.*

†† Capsule equalling the perianth or very slightly exceeding it.

Stems rather stout, 2–4 ft. × $\frac{1}{10}$–$\frac{1}{6}$ in. Flowers $\frac{1}{10}$–$\frac{1}{8}$ in., collected into many-flowered globose heads. Stamens usually 3. Capsule broadly oblong .. .. — 3. *J. vaginatus.*

Stems slender, 1–3 ft. × $\frac{1}{20}$–$\frac{1}{8}$ in. Flowers $\frac{1}{12}$–$\frac{1}{10}$ in., usually distinct in the cyme. Stamens 3. Capsule small, thin, almost globose .. .. — 4. *J. polyanthemos.*

** Leaves 1 or 2, terete like the stem.

Tall salt-marsh plant, 1–3 ft. Cyme large, many-flowered. Stamens 6. Capsule ovoid-trigonous .. .. .. — 5. *J. maritimus.*

B. Graminifolii. *Stem leafy at the base and sometimes upwards as well. Leaves flat or semiterete, not septate within.*

Annual, much branched. Leaves setaceous. Flowers pale, distinct .. .. — 6. *J. bufonius.*

Perennial, simple, 5–10 in. high. Leaves grassy, channelled. Flowers in clusters of 2–6 near the end of the stems .. .. — 7. *J. plebeius.*

Perennial, simple. Leaves grassy, flat or involute. Cyme terminal, lax. Flowers pale, distinct .. .. — 8. *J. tenuis.*

Tall, 6–18 in. Leaves flat, all radical. Flowers brown, in distinct clusters. Stamens 3.. .. .. — 9. *J. planifolius.*

Tall, 6–18 in. Leaves flat or involute, all radical. Flowers brown, in distinct clusters, contracted (in the N.Z. form) into a compound head. Stamens 6 .. .. — 10. *J. caespiticius.*

Small, 1–4 in. Leaves all radical, almost terete. Flowers brown, in a terminal 2–8-flowered head .. .. — 11. *J. antarcticus.*

C. Articulati. *Stem leafy at the base and often upwards as well. Leaves terete or compressed, septate within, the septa usually prominent externally.*

Stems 9–24 in., compressed, 2-edged. Leaves $\frac{1}{10}$–$\frac{1}{6}$ in. across, flat, multitubular. Cyme very large and compound; flowers brown. Stamens 3 .. .. — 12. *J. prismatocarpus.*

Stems 6–18 in. Leaves linear, overtopping the stems, terete or slightly compressed, unitubular. Cymes small, contracted; flowers greenish. Stamens 6 .. .. 13. *J. holoschoenus.*

Stems very slender, 6–18 in. Leaves linear-subulate, shorter than the stems, terete or compressed, unitubular. Cymes divaricate; flowers brown. Stamens 6 .. .. 14. *J. lampocarpus.*

Stems much branched, 2–8 in. Leaves narrow, compressed. Flowers pale, in 3–8-flowered fascicles. Capsule pale, equalling or slightly longer than the perianth .. .. .. 15. *J. scheuchzerioides.*

Stems much branched, 1–6 in. Leaves filiform, terete. Flowers brown, in 2–5-flowered fascicles. Capsule dark-brown or black, much exceeding the perianth .. .. 16. *J. novae-zealandiae.*

Stems much-branched, 1–6 in. Leaves filiform, terete. Flowers pale, in 2–3-flowered fascicles. Capsule pale, slightly exceeding the perianth .. .. 17. *J. pusillus.*

1. **J. pallidus** *R. Br. Prodr.* (1810) 258.—Pale greyish-green, densely tufted, very tall and robust, 2–5 ft. high. Rhizome short, very stout and woody. Stems often $\frac{1}{4}$ in. diam., cylindric, finely striate, with several large and lax sheathing scales at the base, which are usually dark-chestnut below, straw-coloured above, sometimes pale throughout; pith continuous, not irregularly interrupted. Inflorescence lateral; cymes large, much branched, effuse or contracted; branches unequal in length. Flowers $\frac{1}{8}$ in. long, pale, distinct or crowded on the ultimate branches of the cyme, in some forms almost secund. Perianth-segments lanceolate or ovate-lanceolate, acute, rather rigid, pale, the 3 inner slightly smaller than the outer. Stamens 6. Capsule exceeding the perianth, ovoid-trigonous, obtuse, pale, shining, incompletely 3-celled. Seeds very minute, ferruginous, obliquely oblong, tipped with a white point.—*Benth. Fl. Austral.* vii (1878) 130; *Buchen. Monog. Junc.* (1890) 237; *Pflanzenr.* Heft 25 (1906) 139; *Cheesem. Man. N.Z. Fl.* (1906) 725. J. vaginatus *Hook. f. Fl. Nov. Zel.* i (1853) 263; *Handb. N.Z. Fl.* (1864) 289 (*not of R. Br.*). J. macrostigma *Col. in Trans. N.Z. Inst.* xvii (1885) 253.

Var. **triandrus.** — Similar to the typical form in size and habit, but the pith interrupted with irregular cavities, stamens 3 only, and capsule smaller and blunter, more oblong in shape.

North and South Islands: Damp places from the Auckland Isthmus southwards, not uncommon. Sea-level to 2000 ft. December–February. Var. *triandrus:* Vicinity of Auckland, *T. F. C.;* Paterson's Inlet, Stewart Island, *Petrie!*

A common Australian plant. It is without doubt the *Juncus tenax* var. *major* of the Banks and Solander MSS., as pointed out by Dr. Rendle (Journ. Bot. xxxviii (1900) 80); but Brown's name is the earliest accompanied by a sufficient description. The typical state is easily recognized by its large size, the six stamens, and the ovoid-trigonous capsule considerably exceeding the perianth.

2. **J. pauciflorus** *R. Br. Prodr.* (1810) 259. — Usually very slender, 9–24 in. high. Rhizome short, horizontal, creeping. Stems densely crowded on the rhizome, $\frac{1}{25}$–$\frac{1}{10}$ in. diam., erect, terete, wiry, smooth or finely striate; pith continuous or interrupted; basal scales closely appressed, usually red-brown, smooth and shining below, strongly grooved above. Inflorescence lateral; cymes lax, irregularly compound; branches few, slender, spreading. Flowers not nearly so numerous as in the allied species and sometimes very few, distinct, about $\frac{1}{10}$ in. long, pale or dark-chestnut. Perianth-segments equal or the outer rather longer, lanceolate or ovate-lanceolate, acute or the inner obtuse, margins broad, membranous.

Stamens 6 or 3. Capsule exceeding the perianth, ovoid-trigonous, obtuse or shortly pointed, shining, stramineous to chestnut-brown, incompletely 3-celled. Seeds minute, obliquely obovoid, ferruginous, apiculate.—*Benth. Fl. Austral.* vii (1878) 129; *T. Kirk in Trans. N.Z. Inst.* xiv (1882) 384; *Buchen. Monog. Junc.* (1890) 238; *Pflanzenr.* Heft 25 (1906) 140; *Cheesem. Man. N.Z. Fl.* (1906) 725.

Var. **Gunnii** *Buchen. Monog. Junc.* (1890) 239.—Basal leaf-scales and flowers more deeply coloured. Stamens usually 6. Capsule longer, darker at the tip.—*Pflanzenr.* Heft 25 (1906) 141. J. Gunnii *Hook. f. Fl. Tasm.* ii (1860) 67.

North and South Islands: Both the species and variety not uncommon in wet places throughout. Sea-level to 2500 ft. December–February.

Also in Australia, where it ranges from Queensland to Tasmania. In its usual state distinguished without much difficulty by the small size, very slender stems, lax few-flowered inflorescence, and ovoid-trigonous capsule distinctly longer than the perianth, but specimens with a closer many-flowered inflorescence cannot be separated from *J. polyanthemos* in the absence of ripe fruit.

3. **J. vaginatus** *R. Br. Prodr.* (1810) 258.—Very densely tufted, rather stout, 2–3 ft. high or even more. Rhizome stout, woody, creeping. Stems very closely packed on the rhizome, $\frac{1}{12}$–$\frac{1}{6}$ in. diam., strict, erect, terete, finely striate; pith interrupted with irregular cavities; basal sheaths large, rather lax, smooth and shining and dark red-brown at the base, pale straw-coloured and distinctly grooved above. Inflorescence lateral, large, branched; the branches few or many, stiff, erect, rather close together, bearing distinct compact globose many-flowered heads. Flowers $\frac{1}{10}$–$\frac{1}{8}$ in. long, pale-brown. Perianth-segments lanceolate, acute, stramineous, the inner ones rather shorter than the outer. Stamens usually 3, rarely 6. Capsule equalling the perianth or only very slightly exceeding it, broadly oblong, obscurely trigonous, obtuse at the tip.—*Benth. Fl. Austral.* vii (1878) 129; *Buchen. in Engl. Bot. Jahr.* xxi (1895) 264; *Pflanzenr.* Heft 25 (1906) 141; *Cheesem. Man. N.Z. Fl.* (1906) 726. J. australis *Hook. f. Fl. Tasm.* ii (1860) 66, t. 13A; *Handb. N.Z. Fl.* (1864) 289. J. tenax *Sol. in Forst. f. Prodr.* (1786) n. 514, *fide Rendle in Journ. Bot.* xxxviii (1900) 80.

North and South Islands: Marshy places from the North Cape to Banks Peninsula, not uncommon. December–February.

This can be easily separated from the following species by the larger size, by the inflorescence being split up into distinct little rounded cymes or groups of flowers, and by the larger and rather narrower capsule; but some states are difficult to place. Smaller and more slender forms show an approach to *J. pauciflorus*, but the capsule of that species usually much exceeds the perianth.

4. **J. polyanthemos** *Buchen. in Engl. Bot. Jahr.* xx (1895) 261. Brownish-green, very densely tufted, 1–3 ft. high. Rhizome short, horizontal. Stems crowded on the rhizome, $\frac{1}{20}$–$\frac{1}{8}$ in. diam., soft or stiff and wiry, terete, finely striate; pith usually interrupted; basal sheaths appressed, rigid, opaque, smooth below, grooved above. Inflorescence lateral; cymes large, usually dense, but not contracted, much branched; branches slender, unequal. Flowers numerous, small, $\frac{1}{12}$–$\frac{1}{10}$ in. long, green or pale-chestnut, usually scattered along the branches of the cyme, rarely collected into groups. Perianth-segments thin, green, linear-lanceolate, equal or the outer rather longer, acute, thin, margins membranous. Stamens 3, shorter than the perianth; anthers linear. Fruit globose-trigonous, obtuse or almost retuse at the tip, thin, shining, pale ferruginous

or stramineous. Seeds numerous, obliquely obovoid, shortly apiculate; pale ferruginous.—*Pflanzenr.* Heft 25 (1906) 141. J. effusus *Hook. f. Fl. Nov. Zel.* i (1853) 263 (*in part*); *Buchen. Monog. Junc.* (1890) 228; *Cheesem. Man. N.Z. Fl.* (1906) 726 (*not of Linn.*). J. communis *E. Mey. Junc.* (1819) 20; *Benth. Fl. Austral.* vii (1878) 128; *Hook. f. Handb. N.Z. Fl.* (1864) 290. J. luxurians *Col. in Trans. N.Z. Inst.* xix (1887) 269.

Var. **Cheesemanii** *Buchen. l.c.* (1895) 262. — Flowers approximate in few distant spherical glomerules.—*Pflanzenr.* Heft 25 (1906) 142. J. pauciflorus var. Cheesemanii *Buchen. Monog. Junc.* (1890) 23.

North and South Islands, Stewart Island: Abundant in damp places throughout. Sea-level to 3000 ft. *Wiwi.* November–February.

The most abundant species of the genus in New Zealand, everywhere to be seen by the margins of swamps, or in undrained soils that are wet in winter. Whether it is identical with Buchenau's plant is not quite certain; but the common New Zealand form, easily distinguished by the slender rigid and wiry stems with interrupted pith, and with the capsule rounded and imperfectly 3-celled, agrees so closely with his description that I am unable to separate them. But apparently Buchenau has doubts on the subject, for in his recent monograph of the family (Das Pflanzenreich, Heft 25, p. 142) he remarks that *J. polyanthemos* is abundant in most of the Australian colonies, and especially so in Queensland, while in New Zealand only var. *Cheesemanii* is known. His position on this point is puzzling, seeing that he was provided with abundant specimens, and does not allude to them, either in his description of *J. polyanthemos* or under any of the allied species.

5. **J. maritimus** *Lam. Encycl.* iii (1789) 264; var. **australiensis** *Buchen. Monog. Junc.* (1890) 257. — Densely tufted, tall, stout, dark-coloured, 1–4 ft. high. Rhizome short, thick, horizontal. Stems crowded on the rhizome, rigid, wiry, terete, pungent, furnished at the base with several chestnut-brown sheathing scales, the upper 1 or 2 of which are produced into terete leaves similar to the stems but shorter than them. Inflorescence lateral; cymes large, lax, irregularly branched; branches strict, erect. Flowers about $\frac{1}{8}$ in. long, dark chestnut-brown, usually aggregated into little clusters. Perianth-segments lanceolate, acute, the inner rather shorter. Stamens 6; anthers linear. Capsule ovoid-trigonous, acute, only slightly exceeding the perianth, dark chestnut-brown. Seeds obovoid, very shortly tailed.—*Pflanzenr.* Heft 25 (1906) 155; *Cheesem. Man. N.Z. Fl.* (1906) 727. J. maritimus *A. Rich. Fl. Nouv. Zel.* (1832) 145; *A. Cunn. Precur.* (1836) n. 292; *Raoul Choix* (1846) 40; *Hook. f. Fl. Nov. Zel.* i (1853) 263; *Handb. N.Z. Fl.* (1864) 289.

North and South Islands: Brackish-water marshes or sands from the North Cape to Banks Peninsula and Okarito, abundant. Inland on the shores of Lake Rotorua, and by the Waikato River near Orakeikorako. December–January.

Also common on most parts of the Australian coast. It differs from the typical state of the species, which has a wide distribution in the North Temperate Zone, in the darker colour of the whole plant, in the smaller and more densely aggregated darker flowers, in the shorter capsule, and in the less evident tails to the seeds.

6. **J. bufonius** *Linn. Sp. Plant.* (1753) 328.—Annual, pale-green, much branched from the base, often forming dense tufts, 3–12 in. high; roots fibrous. Leaves radical and cauline, very narrow-linear or almost filiform, sheathing at the base, flat or channelled above, grassy, setaceous, pith not

Juncus bufonius, Linn.

not native to N.Z. see T.N.Z.I.

vol. 57, p. 65. (Ckn. & Allan).

Stamens 6 or 3. Capsule exceeding the perianth, ovoid-trigonous, obtuse or shortly pointed, shining, stramineous to chestnut-brown, incompletely 3-celled. Seeds minute, obliquely obovoid, ferruginous, apiculate.—*Benth. Fl. Austral.* vii (1878) 129; *T. Kirk in Trans. N.Z. Inst.* xiv (1882) 384; *Buchen. Monog. Junc.* (1890) 238; *Pflanzenr.* Heft 25 (1906) 140; *Cheesem. Man. N.Z. Fl.* (1906) 725.

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North and South Islands: Both the species and variety not uncommon in wet places throughout. Sea-level to 2500 ft. December–February.

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3. **J. vaginatus** *R. Br. Prodr.* (1810) 258.—Very densely tufted, rather stout, 2–3 ft. high or even more. Rhizome stout, woody, creeping. Stems very closely packed on the rhizome, $\frac{1}{12}$–$\frac{1}{6}$ in. diam., strict, erect, terete, finely striate; pith interrupted with irregular cavities; basal sheaths large, rather lax, smooth and shining and dark red-brown at the base, pale straw-coloured and distinctly grooved above. Inflorescence lateral, large, branched; the branches few or many, stiff, erect, rather close together, bearing distinct compact globose many-flowered heads. Flowers $\frac{1}{10}$–$\frac{1}{8}$ in. long, pale-brown. Perianth-segments lanceolate, acute, stramineous, the inner ones rather shorter than the outer. Stamens usually 3, rarely 6. Capsule equalling the perianth or only very slightly exceeding it, broadly oblong, obscurely trigonous, obtuse at the tip.—*Benth. Fl. Austral.* vii (1878) 129; *Buchen. in Engl. Bot. Jahr.* xxi (1895) 264; *Pflanzenr.* Heft 25 (1906) 141; *Cheesem. Man. N.Z. Fl.* (1906) 726. J. australis *Hook. f. Fl. Tasm.* ii (1860) 66, t. 13A; *Handb. N.Z. Fl.* (1864) 289. J. tenax *Sol. in Forst. f. Prodr.* (1786) n. 514, *fide Rendle in Journ. Bot.* xxxviii (1900) 80.

North and South Islands: Marshy places from the North Cape to Banks Peninsula, not uncommon. December–February.

This can be easily separated from the following species by the larger size, by the inflorescence being split up into distinct little rounded cymes or groups of flowers, and by the larger and rather narrower capsule; but some states are difficult to place. Smaller and more slender forms show an approach to *J. pauciflorus*, but the capsule of that species usually much exceeds the perianth.

4. **J. polyanthemos** *Buchen. in Engl. Bot. Jahr.* xx (1895) 261. Brownish-green, very densely tufted, 1–3 ft. high. Rhizome short, horizontal. Stems crowded on the rhizome, $\frac{1}{20}$–$\frac{1}{8}$ in. diam., soft or stiff and wiry, terete, finely striate; pith usually interrupted; basal sheaths appressed, rigid, opaque, smooth below, grooved above. Inflorescence lateral; cymes large, usually dense, but not contracted, much branched; branches slender, unequal. Flowers numerous, small, $\frac{1}{12}$–$\frac{1}{10}$ in. long, green or pale-chestnut, usually scattered along the branches of the cyme, rarely

or stramineous. Seeds numerous, obliquely obovoid, shortly apiculate; pale ferruginous.—*Pflanzenr.* Heft 25 (1906) 141. J. effusus *Hook. f. Fl. Nov. Zel.* i (1853) 263 (*in part*); *Buchen. Monog. Junc.* (1890) 228; *Cheesem. Man. N.Z. Fl.* (1906) 726 (*not of Linn.*). J. communis *E. Mey. Junc.* (1819) 20; *Benth. Fl. Austral.* vii (1878) 128; *Hook. f. Handb. N.Z. Fl.* (1864) 290. J. luxurians *Col. in Trans. N.Z. Inst.* xix (1887) 269.

Var. **Cheesemanii** *Buchen. l.c.* (1895) 262.—Flowers approximate in few distant spherical glomerules.—*Pflanzenr.* Heft 25 (1906) 142. J. pauciflorus var. Cheesemanii *Buchen. Monog. Junc.* (1890) 23.

North and South Islands, Stewart Island: Abundant in damp places throughout. Sea-level to 3000 ft. *Wiwi.* November–February.

The most abundant species of the genus in New Zealand, everywhere to be seen by the margins of swamps, or in undrained soils that are wet in winter. Whether it is identical with Buchenau's plant is not quite certain; but the common New Zealand form, easily distinguished by the slender rigid and wiry stems with interrupted pith, and with the capsule rounded and imperfectly 3-celled, agrees so closely with his description that I am unable to separate them. But apparently Buchenau has doubts on the subject, for in his recent monograph of the family (Das Pflanzenreich, Heft 25, p. 142) he remarks that *J. polyanthemos* is abundant in most of the Australian colonies, and especially so in Queensland, while in New Zealand only var. *Cheesemanii* is known. His position on this point is puzzling, seeing that he was provided with abundant specimens, and does not allude to them, either in his description of *J. polyanthemos* or under any of the allied species.

5. **J. maritimus** *Lam. Encycl.* iii (1789) 264; var. **australiensis** *Buchen. Monog. Junc.* (1890) 257.—Densely tufted, tall, stout, dark-coloured, 1–4 ft. high. Rhizome short, thick, horizontal. Stems crowded on the rhizome, rigid, wiry, terete, pungent, furnished at the base with several chestnut-brown sheathing scales, the upper 1 or 2 of which are produced into terete leaves similar to the stems but shorter than them. Inflorescence lateral; cymes large, lax, irregularly branched; branches strict, erect. Flowers about $\frac{1}{8}$ in. long, dark chestnut-brown, usually aggregated into little clusters. Perianth-segments lanceolate, acute, the inner rather shorter. Stamens 6; anthers linear. Capsule ovoid-trigonous, acute, only slightly exceeding the perianth, dark chestnut-brown. Seeds obovoid, very shortly tailed.—*Pflanzenr.* Heft 25 (1906) 155; *Cheesem. Man. N.Z. Fl.* (1906) 727. J. maritimus *A. Rich. Fl. Nouv. Zel.* (1832) 145; *A. Cunn. Precur.* (1836) n. 292; *Raoul Choix* (1846) 40; *Hook. f. Fl. Nov. Zel.* i (1853) 263; *Handb. N.Z. Fl.* (1864) 289.

North and South Islands: Brackish-water marshes or sands from the North Cape to Banks Peninsula and Okarito, abundant. Inland on the shores of Lake Rotorua, and by the Waikato River near Orakeikorako. December–January.

Also common on most parts of the Australian coast. It differs from the typical state of the species, which has a wide distribution in the North Temperate Zone, in the darker colour of the whole plant, in the smaller and more densely aggregated darker flowers, in the shorter capsule, and in the less evident tails to the seeds.

6. **J. bufonius** *Linn. Sp. Plant.* (1753) 328.—Annual, pale-green, much branched from the base, often forming dense tufts, 3–12 in. high; roots fibrous. Leaves radical and cauline, very narrow-linear or almost filiform, sheathing at the base, flat or channelled above, grassy, setaceous, pith not jointed. Cyme large, occupying the greater part of the stem; branches long or short, sometimes flexuous. Flowers $\frac{1}{6}$–$\frac{1}{4}$ in. long, sessile or nearly so, solitary or in fascicles of 2–3; bracteoles broadly ovate, scarious, much

shorter than the flowers. Perianth-segments lanceolate, acuminate, with broad scarious margins; the 3 inner rather shorter than the outer. Stamens usually 6, but sometimes 3 only in the terminal flowers. Capsule shorter than the erect perianth-segments, oblong, obtuse. Seeds numerous, minute, ovoid-oblong, obtuse, delicately lineolate.—*Hook. f. Fl. Nov. Zel.* i (1853) 264; *Handb. N.Z. Fl.* (1864) 290; *Benth. Fl. Austral.* vii (1878) 127; *Buchen. Monog. Junc.* (1890) 174; *Pflanzenr.* Heft 25 (1906) 105; *Cheesem. Man. N.Z. Fl.* (1906) 728.

North and South Islands, Chatham Islands, Stewart Island, Auckland Islands: From the Three Kings Islands and the North Cape southwards, abundant. Sea-level to 4000 ft. November–January.

Almost universally distributed in temperate climates. Doubtless introduced with grass-seed in the early days of colonization; but it now extends through the whole of the Dominion.

7. **J. plebeius** *R. Br. Prodr.* (1810) 259. — Densely tufted. Stems 5–10 in. high, smooth, strict, erect, compressed, leafy at the base. Leaves shorter than the stem, narrow, semi-terete, deeply channelled; sheaths close, convolute, produced into two obtuse auricles at the top. Inflorescence terminal. Flowers in clusters of 2–6 near the end of the stem, the flowers sessile in the clusters and usually spreading. Perianth-segments about $\frac{1}{4}$ in. long, lanceolate, rigid, coriaceous, long acuminate, the inner ones somewhat shorter. Stamens usually 3; filaments linear-filiform. Capsule rather shorter than the perianth, ovoid-trigonous. — *Buchen. Pflanzenr.* Heft 25 (1906) 115, t. 62. J. homalocaulis *F. Muell. in First Gen. Rep. Victoria* (1853) 19; *Benth. Fl. Austral.* vii (1878) 128; *Buchen. Monog. Junc.* (1890) 192.

North Island: Mongonui County, near Kaitaia and at Ahipara, *H. Carse!* Buchenau, in the Pflanzenreich, also records it from New Zealand, but without special locality, on the authority of "*Monrad in herb. Hann.*" It has probably been overlooked by other collectors.

8. **J. tenuis** *Willd. Sp. Plant.* ii (1799) 214. — A laxly tufted perennial, with a short rhizome and numerous wiry roots. Stems several in a tuft, slender, erect, wiry, terete, 9–18 in. high. Leaves few, mostly radical, usually shorter than the stem, very narrow-linear, grassy, flat or more generally involute or channelled; base sheathing, membranous. Cymes terminal, lax, much exceeded by the leafy filiform bracts. Flowers $\frac{1}{8}$–$\frac{1}{6}$ in. long, pale-green, remote or clustered. Perianth-segments lanceolate, acuminate, slightly spreading in fruit. Stamens 6, about $\frac{1}{2}$ the length of the perianth-segments; anthers ovate. Style very short. Capsule ovoid-trigonous or almost globose, obtuse or slightly retuse, rather shorter than the perianth-segments, pale stramineous. Seeds obliquely obovoid, minutely apiculate.—*Cheesem. in Trans. N.Z. Inst.* xi (1879) 433; *Buchen. Monog. Junc.* (1890) 193; *Pflanzenr.* Heft 25 (1906) 115; *Cheesem. Man. N.Z. Fl.* (1906) 728. J. involucratus *T. Kirk in Trans. N.Z. Inst.* ix (1877) 550 (*not of Steud.*).

North and South Islands: In various localities from Mangonui to Dunedin, not uncommon. Sea-level to 3000 ft. November–January.

An abundant North American plant, extending into some parts of South America, found also in western Europe, &c. It is a very doubtful native of New Zealand, and has certainly increased its range considerably of late years.

J. macer S.F. Gray *Trans* 1935: 65: 3.

9. **J. planifolius** *R. Br. Prodr.* (1810) 259.—Tufted, perfectly glabrous, 6–18 in. high. Roots many, long, fibrous. Leaves all radical, much shorter than the stems, numerous, flat and grassy, membranous, $\frac{1}{10}$–$\frac{1}{4}$ in. broad, dilated at the base into long imbricating sheaths. Flowering stems or culms long, slender, naked, bearing at the top an irregularly umbellately branched compound cyme; bracts at the base of the inflorescence usually 1 or 2, short, leafy, sometimes small and scarious. Flowers small, $\frac{1}{10}$ in. long, chestnut-brown, crowded in many-flowered heads at the ends of the branches of the cymes. Perianth-segments subequal or the outer rather shorter, oblong-lanceolate, acute. Stamens 3. Capsule equalling the perianth or very slightly longer than it, obovoid, trigonous, mucronate. Seeds numerous, minute, ovoid, very minutely reticulated.—*Raoul Choix* (1846) 40; *Hook. f. Fl. Nov. Zel.* i (1853) 263; *Handb. N.Z. Fl.* (1864) 290; *Benth. Fl. Austral.* vii (1878) 125; *Buchen. Monog. Junc.* (1890) 433; *Pflanzenr.* Heft 25 (1906) 249; *Cheesem. Man. N.Z. Fl.* (1906) 728.

Var. **chathamensis** *Buchen. Monog. Junc.* (1890) 434.—Slender, about 12 in. high. Leaves narrow, $\frac{1}{10}$ in. diam. Perianth-segments deeply coloured, a brown stripe down the centre, margins chestnut-black.—*Pflanzenr.* Heft 25 (1906) 250.

North and South Islands, Stewart Island, Chatham Islands, Auckland Islands: Abundant in moist places throughout. Sea-level to 3000 ft. November–January. Var. *chathamensis:* Chatham Islands, *H. H. Travers.*

An abundant plant throughout the greater part of Australia and Tasmania, also found in Chile.

10. **J. caespiticius** *E. Mey. in Lehm. Pl. Preiss.* ii (1846) 47; var. **bracteatus** *Buchen. Monog. Junc.* (1890) 439.—A tufted perennial 6–18 in. high; roots numerous, fibrous. Leaves all radical, much shorter than the stem, very numerous, grassy, erect, gradually tapering from a long and broad sheathing base to a long subulate acuminate point, margins involute. Flowering stems long, slender, naked. Cyme contracted into a dense conglobate head $\frac{1}{2}$–$1\frac{1}{2}$ in. diam.; bracts at the base 1–3, leafy, much exceeding the cyme. Flowers rather longer than in *J. planifolius*, about $\frac{1}{8}$ in. long, crowded in many-flowered fascicles. Perianth-segments unequal, the 3 outer distinctly shorter. Stamens 6, about $\frac{1}{2}$ the length of the segments. Capsule equalling the perianth or slightly exceeding it, ovoid-trigonous, obtuse, mucronate. Seeds minute, but rather larger than in *J. planifolius*, ovoid, smooth or very indistinctly reticulated.—*Benth. Fl. Austral.* vii

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11. **J. antarcticus** *Hook. f. Fl. Antarct.* i (1844) 79, t. 46.—A small densely tufted perennial 1–4 in. high; roots long, fibrous. Leaves very numerous, all radical, equalling or shorter than the stems, suberect or curved, linear-subulate, flat towards the base, semiterete or obscurely canaliculate above, cylindric towards the apex, obtuse, pith not jointed within; sheathing base long, broad, margins scarious. Stem terete,

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North and South Islands: From the Bay of Islands to Otago, rather local. November–January.

Closely allied to *J. planifolius*, with which it has been confounded by most New Zealand botanists. It can be distinguished by the narrower involute leaves, densely congested cymes, rather larger flowers, the stamens always 6 in number, and in the fewer and larger smoother seeds. The typical state, which is common in Australia, has the cyme laxly branched, with shorter bracts.

11. **J. antarcticus** *Hook. f. Fl. Antarct.* i (1844) 79, t. 46.—A small densely tufted perennial 1–4 in. high; roots long, fibrous. Leaves very numerous, all radical, equalling or shorter than the stems, suberect or curved, linear-subulate, flat towards the base, semiterete or obscurely canaliculate above, cylindric towards the apex, obtuse, pith not jointed within; sheathing base long, broad, margins scarious. Stem terete,

smooth, naked, terminating in a 2–8-flowered head, rarely a second head is produced lower down. Bracts ovate, membranous, rarely longer than the flowers. Flowers crowded, about $\frac{1}{8}$ in. long, dark chestnut-brown. Perianth-segments equal, lanceolate, acute. Stamens 3, rarely 6; anthers ovate. Capsule equalling the perianth, ovoid-trigonous, subacute. Seeds ovoid, obtuse, shining, obsoletely reticulate.—*Handb. N.Z. Fl.* (1864) 290; *Buchen. Monog. Junc.* (1890) 432; *Pflanzenr.* Heft 25 (1906) 249; *Cheesem. Man. N.Z. Fl.* (1906) 729. J. pauciflorus *T. Kirk in Trans. N.Z. Inst.* ix (1877) 551 (*not of R. Br.*). J. brevifolius *T. Kirk in Trans. N.Z. Inst.* xiv (1882) 382.

North Island: Rangipo Plain, near the foot of Ruapehu, *Petrie!* Waimarino, *T. F. C.* South Island: Nelson—Mount Arthur, Mount Owen, *T. F. C.*; Lake Rotoiti, *T. Kirk.* Canterbury—Broken River, *J. D. Enys! T. Kirk! T. F. C.*; Tasman Valley, *T. F. C.* Otago—Not uncommon in the central and southern districts, *Buchanan! Petrie!* Stewart Island: *T. Kirk!* Auckland and Campbell Islands: *Hooker, T. Kirk! B. C. Aston!* Usually from 1500–4000 ft., but descends to sea-level in Otago and the islands to the south. December–February.

A very distinct species. The Campbell Island plant is said to have 6 stamens and the culms hardly longer than the leaves, whereas in New Zealand the stamens are nearly always 3, and the culms usually (but not invariably) exceed the leaves. I agree with Professor Buchenau in considering Kirk's *J. brevifolius* to be a mere state of *J. antarcticus*.

12. **J. prismatocarpus** *R. Br. Prodr.* (1810) 259.—Perennial, laxly tufted. Stems erect or sometimes decumbent and rooting at the nodes towards the base, leafy, compressed, often 2-edged, not jointed, 9–24 in. high. Leaves always shorter than the stems, 3–9 in. long, $\frac{1}{12}$–$\frac{1}{8}$ in. broad, gradually narrowed to an acute tip, strongly compressed, flat, soft, multitubular, incompletely and often indistinctly septate; sheathing base long, compressed, tip with 2 obtuse lobes. Cyme very large and compound, with 1 or 2 short leafy bracts at the base; branches long, slender, divaricating. Flowers $\frac{1}{8}$–$\frac{1}{6}$ in. long, greenish or greenish-brown, in many-flowered globular clusters. Perianth-segments about equal, linear-lanceolate or subulate-lanceolate, acuminate. Stamens 3, much shorter than the segments. Capsule usually considerably longer than the perianth, pale, narrow, prismatic, triquetrous, 1-celled; placentas very feebly developed. Seeds ovoid, apiculate.—*Benth. Fl. Austral.* vii (1878) 131; *Buchen. Monog. Junc.* (1890) 311; *Pflanzenr.* Heft 25 (1906) 180; *Cheesem. Man. N.Z. Fl.* (1906) 730.

North Island: Wet places in lowland stations from the Bay of Islands to Wellington, not uncommon. South Island: Nelson—Motueka Valley, *T. F. C.* November–January.

Easily distinguished from *J. holoschoenus* by the strongly compressed stems, flattened and incompletely septate leaves, large spreading cymes, and by the stamens being 3 only. It is widely diffused in Australia and eastern Asia.

13. **J. holoschoenus** *R. Br. Prodr.* (1810) 259.—Stems laxly tufted, creeping at the base, strict and erect above, terete or subcompressed, smooth, leafy, 6–18 in. high. Leaves few, equalling or exceeding the stems, erect from a long sheathing base, tapering into a long acuminate point, terete or slightly compressed, fistular, completely and distinctly septate. Cymes terminal, sparingly branched, more or less contracted, usually of 3–8 fascicles, rarely more; bract at the base long, foliaceous, usually overtopping the cyme. Flowers 10–20 in each fascicle, greenish,

14. J. articulatus L. (See Brig. Prod. Fl. Corse 1, 264 : 1910)

about $\frac{1}{6}$ in. long. Perianth-segments equal, lanceolate, acuminate. Stamens 6, about $\frac{1}{2}$ the length of the perianth-segments. Capsule equalling the perianth or rather longer than it, narrow, prismatic, triquetrous, 1-celled, the placentas not very conspicuous inside the cells. Seeds ovoid-oblong, grooved and transversely rugose, apiculate at each end.—*Hook. f. Handb. N.Z. Fl.* (1864) 290; *Buchen. Monog. Junc.* (1890) 357; *Pflanzenr.* Heft 25 (1906) 207; *Cheesem. Man. N.Z. Fl.* (1906) 730. J. prismatocarpus *Benth. Fl. Austral.* vii (1878) 131 (*in part*). J. cephalotes *Hook. f. Fl. Nov. Zel.* i (1853) 263 (*not of Thunb.*). New Z. Journ. Bot. 6, 1968 Rec. C. Fl. 4 - 1935 ???

North Island: Swamps from the Bay of Islands southwards to Wellington, not common. Sea-level to 2500 ft. November–February.

Also found in Australia and Tasmania. Bentham unites it with *J. prismatocarpus*, from which it appears to me to be abundantly distinct, as pointed out under that species.

14. **J. lampocarpus** *Ehr. Calam.* (1791) n. 126.—Perennial, more or less densely tufted. Stems erect or ascending, rarely decumbent at the base, slender, terete or compressed, soft, leafy, 6–18 in. high. Leaves shorter than the stems, 3–9 in. long, $\frac{1}{20}$–$\frac{1}{12}$ in. broad, linear-subulate, nearly terete, unitubular, strongly septate;

Juncus lampocarpus, Ehr.

Perhaps not native to N.Z. see T.N.Z.I. vol. 57, p. 65. (Ckn. & Allan).

(1906) 731.

North and South Islands, Stewart Island: From Mangonui southwards, not uncommon in wet places. Sea-level to 3500 ft. November–February.

A common plant in many parts of the North Temperate Zone, but in the Southern Hemisphere apparently restricted to New Zealand. Perhaps not truly indigenous, although now widely spread, even in remote mountain districts.

15. **J. scheuchzerioides** *Gaud. in Ann.* Ser. *Nat.* Ser. i, 5 (1825) 100.—Stems usually much branched below, often prostrate and rooting, 2–8 in. long or more, leafy throughout. Leaves strict, erect, 1–5 in. long, far exceeding the culms, narrow-linear, attenuated at the apex, compressed, striate, pale-green, soft and herbaceous, pith with transverse joints; sheathing base long and broad, membranous, with 2 rounded auricles at the tip. Scape very short, much overtopped by the leaves, bearing 1 or 2 pale-coloured 3–8-flowered heads. Flowers crowded, $\frac{1}{8}$ in. long. Perianth-segments equal, lanceolate, acuminate, with scarious margins. Stamens 6, almost as long as the perianth-segments. Capsule equalling the perianth or rather longer than it, ovoid-trigonous. Seeds numerous, ovoid, obtuse, finely reticulated.—*Hook. f. Fl. Antarct.* i (1844) 80; *Handb. N.Z. Fl.* (1864) 291; *Cheesem. Man. N.Z. Fl.* (1906) 731; *Buchen. Monog. Junc.* (1890) 286; *Pflanzenr.* Heft 25 (1906) 171, t. 86.

South Island: Otago—Lake district, alpine, *Hector* and *Buchanan* (Handbook). Auckland and Campbell Islands: In boggy places, *Hooker, Cockayne, B. C. Aston!* Antipodes Island: *T. Kirk!* Macquarie Island, *H. Hamilton!*

smooth, naked, terminating in a 2–8-flowered head, rarely a second head is produced lower down. Bracts ovate, membranous, rarely longer than the flowers. Flowers crowded, about $\frac{1}{8}$ in. long, dark chestnut-brown. Perianth-segments equal, lanceolate, acute. Stamens 3, rarely 6; anthers ovate. Capsule equalling the perianth, ovoid-trigonous, subacute. Seeds ovoid, obtuse, shining, obsoletely reticulate.—*Handb. N.Z. Fl.* (1864) 290; *Buchen. Monog. Junc.* (1890) 432; *Pflanzenr.* Heft 25 (1906) 249; *Cheesem. Man. N.Z. Fl.* (1906) 729. J. pauciflorus *T. Kirk in Trans. N.Z. Inst.* ix (1877) 551 (*not of R. Br.*). J. brevifolius *T. Kirk in Trans. N.Z. Inst.* xiv (1882) 382.

North Island: Rangipo Plain, near the foot of Ruapehu, *Petrie!* Waimarino, *T. F. C.* South Island: Nelson—Mount Arthur, Mount Owen, *T. F. C.*; Lake Rotoiti, *T. Kirk.* Canterbury—Broken River, *J. D. Enys! T. Kirk! T. F. C.*; Tasman Valley, *T. F. C.* Otago—Not uncommon in the central and southern districts, *Buchanan! Petrie!* Stewart Island: *T. Kirk!* Auckland and Campbell Islands: *Hooker, T. Kirk! B. C. Aston!* Usually from 1500–4000 ft., but descends to sea-level in Otago and the islands to the south. December–February.

A very distinct species. The Campbell Island plant is said to have 6 stamens and the culms hardly longer than the leaves, whereas in New Zealand the stamens are
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compressed, tip with 2 obtuse lobes. Cyme very large and compound, with 1 or 2 short leafy bracts at the base; branches long, slender, divaricating. Flowers $\frac{1}{8}$–$\frac{1}{6}$ in. long, greenish or greenish-brown, in many-flowered globular clusters. Perianth-segments about equal, linear-lanceolate or subulate-lanceolate, acuminate. Stamens 3, much shorter than the segments. Capsule usually considerably longer than the perianth, pale, narrow, prismatic, triquetrous, 1-celled; placentas very feebly developed. Seeds ovoid, apiculate.—*Benth. Fl. Austral.* vii (1878) 131; *Buchen. Monog. Junc.* (1890) 311; *Pflanzenr.* Heft 25 (1906) 180; *Cheesem. Man. N.Z. Fl.* (1906) 730.

North Island: Wet places in lowland stations from the Bay of Islands to Wellington, not uncommon. South Island: Nelson—Motueka Valley, *T. F. C.* November–January.

Easily distinguished from *J. holoschoenus* by the strongly compressed stems, flattened and incompletely septate leaves, large spreading cymes, and by the stamens being 3 only. It is widely diffused in Australia and eastern Asia.

13. **J. holoschoenus** *R. Br. Prodr.* (1810) 259.—Stems laxly tufted, creeping at the base, strict and erect above, terete or subcompressed, smooth, leafy, 6–18 in. high. Leaves few, equalling or exceeding the stems, erect from a long sheathing base, tapering into a long acuminate point, terete or slightly compressed, fistular, completely and distinctly septate. Cymes terminal, sparingly branched, more or less contracted, usually of 3–8 fascicles, rarely more; bract at the base long, foliaceous, usually overtopping the cyme. Flowers 10–20 in each fascicle, greenish,

14. J. articulatus L. (See Brig. Prod. Fl. Corse 1, 264 : 1910)

about $\frac{1}{6}$ in. long. Perianth-segments equal, lanceolate, acuminate. Stamens 6, about $\frac{1}{2}$ the length of the perianth-segments. Capsule equalling the perianth or rather longer than it, narrow, prismatic, triquetrous, 1-celled, the placentas not very conspicuous inside the cells. Seeds ovoid-oblong, grooved and transversely rugose, apiculate at each end.—*Hook. f. Handb. N.Z. Fl.* (1864) 290; *Buchen. Monog. Junc.* (1890) 357; *Pflanzenr.* Heft 25 (1906) 207; *Cheesem. Man. N.Z. Fl.* (1906) 730. J. prismatocarpus *Benth. Fl. Austral.* vii (1878) 131 (*in part*). J. cephalotes *Hook. f. Fl. Nov. Zel.* i (1853) 263 (*not of Thunb.*). New. b. Trans. Rec. 67 : 1935 ???

North Island: Swamps from the Bay of Islands southwards to Wellington, not common. Sea-level to 2500 ft. November–February.

Also found in Australia and Tasmania. Bentham unites it with *J. prismatocarpus*, from which it appears to me to be abundantly distinct, as pointed out under that species.

14. **J. lampocarpus** *Ehr. Calam.* (1791) n. 126.—Perennial, more or less densely tufted. Stems erect or ascending, rarely decumbent at the base, slender, terete or compressed, soft, leafy, 6–18 in. high. Leaves shorter than the stems, 3–9 in. long, $\frac{1}{20}$–$\frac{1}{12}$ in. broad, linear-subulate, straight or curved, compressed or nearly terete, unitubular, strongly septate; sheathing base long and narrow, with 2 obtuse auricles at the tip. Cyme terminal, compound; branches slender, divaricate, bearing small 2–5-flowered heads at the tips and in the axils; lower bract much shorter than the cyme, leafy. Flowers small, $\frac{1}{10}$–$\frac{1}{8}$ in. long, chestnut-brown. Perianth-segments equal, lanceolate, acute. Stamens 6, much shorter than the segments. Capsule exceeding the perianth, narrow, pyramidal, triquetrous, mucronate, reddish-brown, glossy, 1-celled. Seeds obovoid, reticulate.—*T. Kirk in Trans. N.Z. Inst.* vii (1875) 378; *Buchen. Monog. Junc.* (1890) 376; *Pflanzenr.* Heft 25 (1906) 217; *Cheesem. Man. N.Z. Fl.* (1906) 731.

North and South Islands, Stewart Island: From Mangonui southwards, not uncommon in wet places. Sea-level to 3500 ft. November–February.

A common plant in many parts of the North Temperate Zone, but in the Southern Hemisphere apparently restricted to New Zealand. Perhaps not truly indigenous, although now widely spread, even in remote mountain districts.

15. **J. scheuchzerioides** *Gaud. in Ann.* Ser. *Nat.* Ser. i, 5 (1825) 100.—Stems usually much branched below, often prostrate and rooting, 2–8 in. long or more, leafy throughout. Leaves strict, erect, 1–5 in. long, far exceeding the culms, narrow-linear, attenuated at the apex, compressed, striate, pale-green, soft and herbaceous, pith with transverse joints; sheathing base long and broad, membranous, with 2 rounded auricles at the tip. Scape very short, much overtopped by the leaves, bearing 1 or 2 pale-coloured 3–8-flowered heads. Flowers crowded, $\frac{1}{8}$ in. long. Perianth-segments equal, lanceolate, acuminate, with scarious margins. Stamens 6, almost as long as the perianth-segments. Capsule equalling the perianth or rather longer than it, ovoid-trigonous. Seeds numerous, ovoid, obtuse, finely reticulated.—*Hook. f. Fl. Antarct.* i (1844) 80; *Handb. N.Z. Fl.* (1864) 291; *Cheesem. Man. N.Z. Fl.* (1906) 731; *Buchen. Monog. Junc.* (1890) 286; *Pflanzenr.* Heft 25 (1906) 171, t. 86.

South Island: Otago—Lake district, alpine, *Hector* and *Buchanan* (Handbook). Auckland and Campbell Islands: In boggy places, *Hooker, Cockayne, B. C. Aston!* Antipodes Island: *T. Kirk!* Macquarie Island, *H. Hamilton!*

I have seen no specimens of this from the mainland of New Zealand, but those gathered by H. Hamilton on Macquarie Island exactly correspond with others collected by Aston on Auckland Islands and by Kirk on Antipodes Island. But they all differ from Buchenau's fine plate in the Pflanzenreich in being much smaller, less branched, and having much less conspicuous leaf-sheaths. Buchenau appears to doubt the identity of the New Zealand plant with the South American, but does not state how they differ. *J. scheuchzerioides* is very closely allied to *J. pusillus* and *J. novae-zealandiae*, and small specimens, especially when in young flower, may easily be confused with either of them.

In the "Flora Antarctica" Hooker describes a var. *inconspicuus*, which is distinguished by its small size and minute leaves, which far exceed the solitary flowers. Hooker quotes Campbell Island as a habitat, but in the Pflanzenreich Buchenau limits it to the South American forms, and maintains it as a separate species.

16. **J. novae-zealandiae** *Hook. f. Fl. Nov. Zel.* i (1853) 264. — Stems very slender, much branched, densely tufted, often forming large patches, creeping and rooting at the base, erect above, 1–6 in. high. Leaves longer or shorter than the stem and sheathing it for the greater part of its length, very slender, filiform, terete, striate, pith with transverse joints; sheathing base long, membranous, with 2 rounded lobes at the tip. Flowers $\frac{1}{10}$ in. long, chestnut-brown, in 2–5-flowered fascicles; fascicles either solitary and terminal or 2–3 superposed. Perianth-segments ovate or ovate-lanceolate, obtuse, usually chestnut-brown, margins broad, membranous, hyaline. Stamens 6, equalling the perianth-segments or slightly exceeding them. Capsule $\frac{1}{8}$–$\frac{1}{6}$ in. long, much longer than the perianth, broadly ovoid-trigonous, obtuse, shortly mucronate, dark chestnut-brown or almost black, smooth, shining. Seeds minute, ovoid, pale-brown; testa minutely reticulate.—*Handb. N.Z. Fl.* (1864) 391; *Buchen. Monog. Junc.* (1890) 289; *Cheesem. Man. N.Z. Fl.* (1906) 732; *Buchen. Pflanzenr.* Heft 25 (1906) 172.

North and South Islands, Stewart Island: Mountain-swamps from the East Cape and Taranaki southwards, abundant. Sea-level to 4500 ft. December–March.

17. **J. pusillus** *Buchen. in Abh. Nat. Ver. Bremen*, vi (1879) 395. — Very similar to *J. novae-zealandiae* in habit and general appearance, but paler, rather smaller, and still more slender. Leaves longer or shorter than the stems, capillary, terete, striate, pith with transverse joints; sheaths thin and membranous, with hyaline margins and 2 rounded lobes at the top. Flowers pale-coloured, small, about $\frac{1}{12}$ in. long, solitary or in 2–3-flowered fascicles; fascicles seldom more than one. Perianth-segments lanceolate or ovate-lanceolate, acute or subacute, pale-green; margins membranous. Stamens 6, equalling the perianth-segments or rather longer. Capsule $\frac{1}{10}$ in. long, slightly exceeding the perianth, narrow ovoid-trigonous, shortly beaked, pale, smooth. Seeds smaller and narrower than in *J. novae-zealandiae.*—*Monog. Junc.* (1890) 290; *Cheesem. Man. N.Z. Fl.* (1906) 732; *Buchen. Pflanzenr.* Heft 25 (1906) 172. J. capillaceus *Hook. f. Fl. Nov. Zel.* i (1853) 264; *Handb. N.Z. Fl.* (1864) 291; *Fl. Tasm.* ii (1860) 65, t. 134B; *Benth. Fl. Austral.* vii (1878) 132 (*not of Lamarck*).

North and South Islands: Swampy places from the Bay of Plenty southwards, not so common as *J. novae-zealandiae.* Sea-level to 4000 ft. December–March.

There is little to distinguish this from the preceding species, except the smaller size, the smaller paler-coloured flowers, and the narrower capsule, which is frequently scarcely longer than the perianth. I have several states that appear to be quite intermediate. It is also found in south-eastern Australia and Tasmania.

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Key to LUZULA (after Buchanan)

1. Plantae parvae, pulviniformes 2
   Plantae stoloniferae, not caespitosae . . 7
2. Caules inter folia occulti . . . Colensoi
   Caules non inter folia occulti 3
3. Caules folia subaequantes 4
   Caules folia superantes 6
4. Stamina 3 . . . . . triandra
   Stamina 6 5
5. Folia planiuscula, o.7 -1.1 mm. lata . . . . . micrantha
   Folia sutulata, usque 0.5 mm. lata . . . . . crenulata
6. Tepala e basi lanceolato-lineari subulata haud distincte vel anguste marginata humila
   Tepala ovato-lanceolata, acutata, laterilus et marginibus niveo-mentranaceis . . . . . cheesemanii
7. Planta parva, flores triandri . zeptophylla
   Plantae altiores, flores hexandri . . . 8
8. Inflorescentiae laxae 9
   Inflorescentiae conglobatae 13
9. Folia erecta, marginibus + parallelis . . . . . rhadina
   Folia + distantia, sensim angustata . . .10
10. Flores 4-5 mm. longi . . . . . picta
    Flores 2-3-(3.5) mm. longi 11
11. Margines foliorum valde ciliati . . crinita
    Margines foliorum minus ciliati 12
12. Infl. composita; tepala intense castanea marginibus angustis . . . . . Petrieana
    Infl. decomposita, tepala medio nunc intense nunc dilute colorata, margin. memb. migrata
13. Margines foliorum valde ciliati . . crinita
    Margines foliorum minus ciliati 14
14. Tepala 4 mm., medis intense castanea . . . . . Banksiana
    Tepala 2.5-3.5, medio dilute colorata . . . . . australesica

(to add - floribunda)

L. Traversii and L. ulophylla have acute leaf-tips.

3. **LUZULA** DC.

Perennial herbs, usually tufted. Leaves grass-like, mostly radical, more or less ciliate with long flexuous white hairs. Flowers small, crowded in small fascicles or placed singly, the fascicles or single flowers arranged in an irregularly branched simple or compound umbel or cyme, sometimes contracted into a globose or spiciform head, each flower with a bract and 2 bracteoles. Perianth-segments 6, glumaceous, distinct. Stamens 6, hypogynous or the 3 inner attached to the base of the segments; filaments filiform; anthers oblong or linear. Ovary sessile, 1-celled; style filiform with 3 long stigmatic lobes; ovules 3, erect from a short basal placenta. Capsule 3-valved. Seeds 3, or fewer by abortion, globose or ovoid; testa minutely reticulated.

Species about 65, most plentiful in the temperate portions of the Northern Hemisphere, also found on the mountains of the tropics. The Australian and New Zealand species are all very near to the protean *L. campestris*, and are so highly variable as to present an almost inextricable series of closely allied forms.

* Small, 1–2 in. high, forming compact cushion-shaped masses.

Stems much shorter than the leaves and concealed by them. Flowers pale .. .. 1. *L. Colensoi.*
Stems about equalling the leaves. Inflorescence simple. Perianth-segments lanceolate, acute .. .. 2. *L. micrantha.*
Stems exceeding the leaves. Inflorescence usually simple. Perianth-segments subulate, acuminate, dark-chestnut with very narrow margins .. .. 3. *L. pumila.*
Stems exceeding the leaves. Inflorescence usually compound. Perianth-segments ovate-lanceolate, acuminate, with broad white margins .. .. 4. *L. Cheesemanii.*

** Stems often densely tufted but never forming cushion-shaped masses.

Small, slender, 1–4 in. high. Inflorescence a terminal solitary 3–8-flowered head. Stamens 3 .. .. 5. *L. leptophylla.*
Variable in size, 4–18 in. Leaf-tip obtuse, often callous. Inflorescence lax or contracted, many-flowered .. .. .. 6. *L. campestris.*
Usually from 6 to 14 in. Leaf-tip subulate, acute. Inflorescence of dense spikes congested into a pyramidal head .. .. 7. *L. Traversii.*
Stems 4–8 in. Leaves 1½–2½ in. Margins and back covered with entangled white woolly hairs; tip subulate, acute. Inflorescence of a single ovoid-globose head .. .. 8. *L. ulophylla.*

1. **L. Colensoi** *Hook. f. Handb. N.Z. Fl.* (1864) 293.—Small, moss-like, densely tufted, nearly glabrous, forming rounded cushions 1–3 in. across. Stems very short. Leaves much longer than the stems, $\frac{1}{4}$–$\frac{3}{4}$ in. long, subulate, tapering from a broad sheathing base to an obtuse tip, rigid and coriaceous, channelled in front, convex on the back, glabrous above the middle, margins of the sheath and lower part of the leaf sparingly ciliate. Inflorescence of 2 to 6 few-flowered fascicles compacted into a dense head concealed among the leaves; lower bracts leafy, exceeding the flowers; remainder small, white, membranous, lacerate. Flowers about $\frac{1}{12}$ in. long. Perianth-segments equal, ovate-lanceolate, acute or subacute, chestnut-brown with pale membranous margins and tips. Stamens 6, from slightly shorter to slightly longer than the segments. Capsule almost equalling the perianth, ovoid-globose, trigonous, red-brown. Seeds ferruginous, obliquely ovoid.—*Buchen. Monog. Junc.* (1890) 145; *Pflanzenr.* Heft 25 (1906) 96; *Cheesem. Man. N.Z. Fl.* (1906) 734; *Ill. N.Z. Fl.* ii (1914) t. 204A.

North Island: Ascends to the summit of Tongariro, *T. F. C.*; Mount Egmont, *T. F. C.*; Ruapehu, *H. Hill! Spencer!* Ruahine Mountains, *Colenso! B. C. Aston!* Mount Holdsworth, *W Townson!* South Island: Nelson—Gordon's Nob, Mount Owen, Mount Peel, *T. F. C.* Westland—Kelly's Hill, *Petrie! Cockayne!* Otago—Longwood Range, *T. Kirk!* 4000–6500 ft. January–February.

Var. **macrostemon** *Buchen. in Oesterr. Bot. Zeit.* (1898) 210.—Stamens distinctly overtopping the perianth-segments; seeds not carunculate.

Easily distinguished by its small size and very short stems, the flowers being sunk among the leaves. Buchenau's var. *macrostemon*, separated on account of the stamens slightly exceeding the perianth, does not appear to me to be really distinct, the stamens often varying in length.

2. **L. micrantha** *Buchen. in Oesterr. Bot. Zeit.* (1898) 166, 243.—Densely tufted, forming compact rounded patches. Stems rigid, erect, $\frac{1}{2}$–$1\frac{1}{2}$ in. high, leafy at the base. Leaves equalling the stems, straight, rigid, erect, narrow-linear, obtuse at the tip, broadly sheathing at the base, flat or slightly concave in front, rounded or almost flat at the back; margins cartilaginous, glabrous; sheaths membranous, striate, slightly ciliate at the tip. Inflorescence simple, terminal, capitate, 3–8-flowered; the lowest bract (or the 2 lowest) foliaceous, overtopping the inflorescence, the remainder small, membranous, lacerate. Flowers about $\frac{1}{10}$ in. long. Perianth-segments equal, lanceolate, acute, reddish-brown, with very narrow hyaline margins. Stamens 6, rather more than $\frac{1}{2}$ as long as the perianth-segments. Capsule elliptic-trigonous, almost equalling the perianth, acute, shining, red-brown, paler at the base.—*Pflanzenr.* Heft 25 (1906) 96; *Cheesem. Man. N.Z. Fl.* (1906) 734.

Var. **triandra** *Cheesem. Man. N.Z. Fl.* (1906) 734.—Size and habit of the type, but leaves rather narrower, often curved, and usually canaliculate. Heads 6–12-flowered. Stamens 3.—L. triandra *Buchen. l.c.*

Var. **crenulata** *Cheesem. l.c.*—Very densely pulvinate. Leaves very narrow, subulate, canaliculate. Inflorescence 2–6-flowered. Perianth-segments crenulate at the tips. Stamens 6. Capsule obovoid, trigonous, obtuse.—L. crenulata *Buchen. l.c.*

South Island: Otago—Mount Cardrona, *Petrie!* Vars. *triandra* and *crenulata*: Rock and Pillar Range, *Petrie!* 4000–6000 ft. December–February.

The three plants united here under the name of *L. micrantha* are considered by Buchenau to represent three distinct species. I possess very poor material; but so far as it goes, I should hesitate at giving them higher rank than that of varieties.

3. **L. pumila** *Hook. f. Handb. N.Z. Fl.* (1864) 293.—Small, densely tufted, forming small cushion-shaped masses. Stems slender, erect, 1–2 in. high. Leaves shorter than the stems, $\frac{1}{3}$–1 in. long, linear-subulate, gradually narrowed to an obtuse tip, strict, erect, rigid, striate, channelled in front, convex behind, margins of the lower half and sheath sparingly ciliate. Inflorescence a dense terminal 4–10-flowered head; lowest bract foliaceous; the rest membranous, lacerate, pale chestnut-brown. Flowers about $\frac{1}{10}$ in. long, chestnut-brown. Perianth-segments subulate-lanceolate, long acuminate, the 3 outer distinctly larger, dark-chestnut, without pale margins or with very indistinct ones. Stamens 6, about $\frac{1}{2}$ as long as the perianth-segments. Capsule broadly obovoid, trigonous, from $\frac{1}{2}$ to $\frac{2}{3}$ the length of the perianth, dark chestnut-brown or almost black. Seeds oblong, minutely carunculate at the base.—*Buchen. Monog. Junc.* (1890) 144; *Pflanzenr.* Heft 25 (1906) 97; *Cheesem. Man. N.Z. Fl.* (1906) 735.

North Island: Mount Egmont, *Cockayne*. South Island: Nelson—Mountains above the Wairau Gorge, *T. F. C.*; Mount Captain, *T. Kirk!* Canterbury—Mount Torlesse, *Haast! T. F. C.*; Craigieburn Mountains, *Cockayne!* Mount Arrowsmith, *Cockayne* and *R. M. Laing!* Mount Darwin, *Haast!* Mount Dobson, *T. F. C.* Otago—Not uncommon on the central and western mountains, *Petrie!* 4000–6500 ft. January–February.

Best recognized by the stems distinctly overtopping the leaves, lanceolate-subulate perianth-segments, which are dark-chestnut with a very inconspicuous pale margin, and short almost black capsule.

4. **L. Cheesemanii** *Buchen. Monog. Junc.* (1890) 146.—Small, densely tufted, forming compact patches. Stems slender, erect, 1–2 in. high. Leaves shorter than the stems or equalling them, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, linear-subulate, obtuse at the tip, rigid, concave in front, rounded on the back, grooved, margins ciliated throughout with long white hairs. Inflorescence of from 1 to 3 2–6-flowered fascicles congested into a terminal head; lowest bract leafy, often reddish, equalling the head; the remainder small, white, membranous. Flowers $\frac{1}{9}$ in. long. Perianth-segments about equal, ovate-lanceolate, acute, thin, with a blackish-chestnut stripe down the centre and very broad silvery-white margins. Stamens 6, about $\frac{1}{2}$ as long as the perianth-segments. Capsule shorter than the perianth, ovoid-globose, trigonous, mucronate, dark chestnut-brown or almost black. Seeds obliquely ovoid, minutely carunculate at the base.—*Pflanzenr.* Heft 25 (1906) 98; *Cheesem. Man. N.Z. Fl.* (1906) 735; *Ill. N.Z. Fl.* ii (1914) t. 204B.

South Island: Nelson—Summit of Gordon's Nob, *T. F. C.* Marlborough—Mount Mouatt, *T. Kirk!* Canterbury—Black Range, *T. F. C.*; Craigieburn Mountains, *Petrie!* Mount Peel, *H. H. Allan.* Otago—Mount Kyeburn, Dunstan Mountains, *Petrie!* 4000–6000 ft. December–February.

Closely allied to *L. pumila*, from which it differs in the more compound inflorescence, and in the much broader perianth-segments, with very conspicuous silvery-white margins.

5. **L. leptophylla** *Buchen. and Petrie in Oesterr. Bot. Zeit.* (1898) 214, 243, t. 7.—Small, slender, stoloniferous, 1–4 in. high. Leaves all radical, much shorter than the stems, $\frac{1}{2}$–2 in. long, very narrow, almost filiform, tip obtuse, margins convolute, glabrous or nearly so, mouth of the sheath with a tuft of slender hairs. Inflorescence terminal, of a single 3–8-flowered head, or more rarely the head consists of 2 closely compacted clusters; bract at the base of the head small, leafy. Flowers small, about $\frac{1}{12}$ in. long. Perianth-segments about equal or the outer a little shorter, ovate or ovate-lanceolate, acute, central portion dark chestnut-brown or almost black; margins broad, pale, membranous. Stamens 3, filaments filiform. Capsule equalling the perianth, rounded-obovoid, shining, dark-chestnut, sometimes almost black.—*Buchen. in Pflanzenr.* Heft 25 (1906) 81; *Cheesem. Man. N.Z. Fl.* (1906) 736.

South Island: Otago—Mount Kyeburn, *Petrie!* 2000–3500 ft. December–January.

A very curious little plant, of which I have seen no specimens except Mr. Petrie's. It appears to differ from reduced states of *L. campestris* in the exceedingly slender stems, almost filiform leaves, and 3 stamens.

6. **L. campestris** *DC. Fl. Fr.* iii (1805) 161.—Excessively variable in all its parts. Stems more or less densely tufted, stout or slender, very variable in size, usually from 6–14 in. high, but often reduced to 2 in., and sometimes reaching 18 or 20 in. Leaves mostly radical, always shorter

L. weltrainii Buch. Oest. Bot. Zeit. 1898: 72.

than the stems, generally flat and grassy, but varying in breadth from $\frac{1}{10}$ to $\frac{1}{3}$ in., gradually narrowed into an obtuse and usually callous tip; margins flat or thickened, more or less ciliate with long hairs and often copiously so. Inflorescence very variable, in the most developed forms of numerous clusters on the branches of an umbellate cyme, the branches very unequal in length; but frequently the clusters are greatly reduced in number, and the branches are often so short that the inflorescence is congested into a pyramidal or ovoid entire or lobed head. Lower bracts foliaceous; upper membranous, entire or lacerate, more or less ciliate. Flowers $\frac{1}{10}$–$\frac{1}{6}$ in. long. Perianth-segments ovate or ovate-lanceolate, acute, subequal, margins usually membranous, often white. Stamens 6. Capsule equalling the perianth, broadly ovoid or obovoid, trigonous, obtuse, usually shortly mucronate.—*Hook. f. Fl. Nov. Zel.* i (1853) 264; *Handb. N.Z. Fl.* (1864) 292; *Benth. Fl. Austral.* vii (1878) 292; *Buchen. Monog. Junc.* (1890) 155, *and in Oesterr. Bot. Zeit.* (1898) 161, t. 7; *also in Pflanzenr.* Heft 25 (1906) 83; *Cheesem. Man. N.Z. Fl.* (1906) 736.

(Kos. et A. Rich) Buchen. in Oestr. Bot. Zeit.

Var. **picta** *Hook. f. Handb. N.Z. Fl.* (1864) 292.—Slender, often flaccid, 3–18 in. high. Leaves flat, grassy. Inflorescence lax, the clusters rather few, the lateral ones peduncled. Flowers $\frac{1}{8}$–$\frac{1}{6}$ in. long. Perianth-segments linear-lanceolate, long-acuminate, with very broad white membranous margins and a narrow stripe of dark or pale chestnut-brown down the middle. Capsule shorter than the perianth, obovoid, trigonous.—L. picta *A. Rich. Fl. Nouv. Zel.* (1832) 146; *A. Cunn. Precur.* (1836) n. 295; *Raoul Choix* (1846) 40; *Hook. f. Fl. Nov. Zel.* i (1853) 265; *Buchen. Monog. Junc.* (1890) 146. L. subclavata *Col. in Trans. N.Z. Inst.* xviii (1886) 276. L. campestris DC. *var.* picta *Buchen. in Oesterr. Bot. Zeit.* (1898) 217, *and in Pflanzenr.* Heft 25 (1906) 88; *Cheesem. Man. N.Z. Fl.* (1906) 737.

North and South Islands, Stewart Island: Abundant throughout, usually in shaded places. Sea-level to 3500 ft.

(L. maxima)

Var. **Banksiana** *Buchen. in Oesterr. Bot. Zeit.* (1898) 218. — Stout. Stems strict, about 8–10 in. high. Leaves numerous, equalling the stem or sometimes exceeding them, broad, sometimes $\frac{1}{3}$ in. broad; margins thickened, long-ciliate. Inflorescence congested into a large conglobate head; bracts 2–3, not exceeding the inflorescence. Perianth-segments narrow-lanceolate, acute, a chestnut stripe down the centre, the remainder white. Capsule shorter than the perianth.—*Pflanzenr.* Heft 25 (1906) 90; *Cheesem. Man. N.Z. Fl.* (1906) 737. L. Banksiana *E. Mey. in Linnaea*, xxii (1849) 412. L. picta *var.* Banksiana *Buchen. Monog. Junc.* (1890) 147.

L. campestris var. picta (Hook. f. & A. Rich) Hook. f. Handb. 1864

North Island: *Banks* and *Solander, fide Buchenau.* Stewart Island: *Cockayne.* I have not seen specimens of this, which is probably an intermediate form between *picta* and *australasica.*

(Steud.) Stewart.

Var. **australasica** *Buchen. l.c.* 216.—Rather stout, 3–12 in. high or more. Leaves flat, coriaceous, $\frac{1}{8}$–$\frac{1}{3}$ in. broad; margins thickened, cartilaginous, conspicuously ciliate. Inflorescence contracted into an ovoid head $\frac{1}{4}$–$\frac{3}{4}$ in. diam., often with several smaller lateral pedunculated heads. Upper bracts ciliate. Flowers about $\frac{1}{8}$ in. long. Perianth-segments lanceolate, acuminate, margins broad, white, membranous, central stripe chestnut-brown or red. Capsule ovoid-trigonous, slightly shorter than the perianth.—*Buchen. in Pflanzenr.* Heft 25 (1906) 92; *Cheesem. Man. N.Z. Fl.* (1906) 737. L. australasica *Steud. Syn. Pl. Glum.* ii (1855) 294. L. Oldfieldii *Hook. f. Fl. Tasm.* ii (1860) 68; *Handb. N.Z. Fl.* (1864) 293; *Benth. Fl. Austral.* vii (1878) 122; *Buchen. Monog. Junc.* (1890) 154.

North and South Islands, Chatham Islands, Stewart Island: Hilly and mountainous districts from Taupo southwards, ascending to 4000 ft. Buchenau remarks, in his paper "*Luzula campestris* und Verwandte Arten," that this form can no longer be regarded as a distinct species. Its chief characteristics are the compact inflorescence, the thickened margins of the leaves, and the colour of the perianth-segments, which are brownish beneath, and more or less pure-white above, with a narrow chestnut stripe down the centre. It varies into the varieties *picta, migrata,* and *crinita.*

L. rhadina Balch. Kunow 3000 ft. D. Petrie

Var. **Petriana** *Buchen. l.c.* 219.—Rather stout, tufted, 4–12 in. high. Leaves narrow, $\frac{1}{15}$–$\frac{1}{8}$ in. broad, sparingly ciliate. Inflorescence compound, usually with the lateral clusters shortly stipitate, or rarely the inflorescence may be contracted into a conglobate head. Upper bracts more or less lacerate. Perianth-segments lanceolate, acute, dark chestnut-brown without white margins or very narrow ones. Capsule shorter than the perianth.—*Pflanzenr.* Heft 25 (1906) 92; *Cheesem. Man. N.Z. Fl.* (1906) 737.

North and South Islands, Stewart Island, Auckland Islands: Apparently abundant in hilly or mountain districts throughout, ascending to 4500 ft. I have seen no specimens from the Auckland Islands, but Buchenau refers to one collected by T. Kirk. To var. *Petriana* I refer his *L. Wettsteinii* (*Pflanzenr.* Heft 25 (1906) 81).

Var. **floribunda** *Buchen. in Pflanzenr.* Heft 25 (1906) 93.—Stout, densely tufted; stems firm, 10–15 in. high. Basilar leaves numerous, rather broad, apex channelled, obtuse at the tip. Lowest bracts 2–4, large, leafy, equalling or exceeding the inflorescence; bracts of the flower small, scarcely ciliate. Heads very numerous (Buchenau has counted as many as 55), 20- to 25-flowered, $\frac{1}{5}$–$\frac{1}{3}$ in. diam. Perianth-segments lanceolate, acute, chestnut, the inner segments paler at the tip. Caruncle of seed small.

South Island, Stewart Island, Auckland Islands: Apparently not uncommon in mountain districts throughout. Wairau Gorge, Mount Peel, Waimakariri Glacier, *T. F. C.*; Craigieburn Mountains, *Cockayne!* Otira River and Kelly's Hill, *Petrie!* Auckland Islands, *B. C. Aston! J. S. Tennant.* Dr. Buchenau considers that the affinity of this plant is with var. *crinita*.

Var. **crinita** *Buchen. in Oesterr. Bot. Zeit.* (1898) 215.—Stout, strict, 3–14 in. high. Leaves numerous, flat or involute, $\frac{1}{12}$–$\frac{1}{4}$ in. broad; margins thickened, densely and conspicuously ciliate. Inflorescence contracted into a compact ovoid head, sometimes with 1–3 smaller lateral peduncled ones. Lower bracts long, ciliate, involucrate; upper membranous, lacerate and densely ciliate. Flowers $\frac{1}{10}$ in. long. Perianth-segments lanceolate, long-acuminate, dark chestnut-brown, sometimes almost black. Capsule almost equalling the perianth.—*Buchen. in Pflanzenr.* Heft 25 (1906) 93; *Cheesem. Man. N.Z. Fl.* (1906) 737. L. crinita *Hook. f. Fl. Antarct.* i (1844) 84, t. 48; *Handb. N.Z. Fl.* (1864) 293; *Buchen. Monog. Junc.* (1890) 151.

Auckland and Campbell Islands, Macquarie Island: Abundant from sea-level to 1500 ft. The typical form appears to be confined to the above localities, but specimens with intermediate characters between it and *australasica*, *floribunda*, and *migrata* are not uncommon in the mountains of the South Island.

Var. **migrata** *Buchen. l.c.* 242.—Very closely allied to the northern *L. campestris* var. *multiflora*, differing chiefly in the shorter and more slender stems, often bulbous at the base, narrower leaves, and smaller inflorescence. Stems tufted, 4–15 in. high. Leaves $\frac{1}{8}$–$\frac{1}{5}$ in. broad; margins flat, not usually cartilaginous, ciliate, but not conspicuously so. Inflorescence well developed, usually lax, the lateral clusters pedunculate. Perianth-segments lanceolate, acute, dark chestnut-brown with white membranous margins.—*Pflanzenr.* Heft 25 (1906) 94; *Cheesem. Man. N.Z. Fl.* (1906) 737. L. campestris *var. a Hook. f. Handb. N.Z. Fl.* (1864) 292. L. rhadina *Buchen. l.c.* 212 (a form with very narrow erect leaves).

North and South Islands, Stewart Island, Chatham Islands: Abundant throughout, from sea-level to 4500 ft.

L. campestris is widely distributed in temperate and montane districts in most parts of the world, and particularly in New Zealand, where it has developed into a bewildering variety of closely allied forms. In arranging the New Zealand forms I have mainly followed Buchenau's memoir entitled "*Luzula campestris* und Verwandte Arten," published in Oesterr. Bot. Zeit., 1898. It is necessary for the student to bear in mind that the characters given for the varieties are those of prominent forms only, that intermediates between all of them are plentiful, and that aberrant states are not uncommon.

7. **L. Traversii** *Cheesem. n. comb.*—Stems densely tufted, very variable in size, usually from 6 to 12 in., but sometimes attaining 18 in. and occasionally dwarfed to 4 in., slender, often attenuate above. Leaves

radical and a few cauline, all much shorter than the stem, 1–6 in. long, rarely more, $\frac{1}{10}$–$\frac{1}{4}$ in. broad at the base and from thence gradually tapering upwards, apex subulate, not obtuse as in the forms of *L. campestris;* margins flat or involute, ciliate with long hairs. Inflorescence terminal, erect or nodding, compound, of several short and dense spikes either all congested into an ovoid head, or the lower 1 to 3 distinct and sometimes peduncled. Lower bracts foliaceous, often overtopping the inflorescence; upper membranous, with very broad white margins and apices, densely ciliate with long hairs. Flowers small, $\frac{1}{10}$ in. long. Perianth-segments equal, or the outer slightly longer, lanceolate, awned, pale-chestnut with white and silvery margins. Stamens 3, rarely more. Capsule equalling the perianth, ovoid-globose, trigonous, mucronate, pale- or dark-chestnut, sometimes almost black. Seeds oblong-ovoid, ferruginous.—L. racemosa *Desv. Journ. Bot.* i (1808) 162; *var.* Traversii *Buchen. Monog. Junc.* (1890) 133, *and in Pflanzenr.* Heft 25 (1906) 75; *Cheesem. Man. N.Z. Fl.* (1906) 738.

South Island: Nelson—Mountains above the Wairau Gorge, *T. F. C.* Marlborough—Mount Mouatt, *T. Kirk!* Canterbury—Broken River basin and Upper Waimakariri, *T. Kirk! T. F. C., Cockayne!* Mount Peel, *H. H. Allan!* Mount Arrowsmith district, *Cockayne* and *R. M. Laing;* Mount Cook district, *T. F. C.* Otago—Mount Pisa, Mount Kyeburn, Old Man Range, Mount Ida, *Petrie!* Mount Earnslaw, *Cockayne!* 2000–5500 ft. December–February.

Probably an abundant mountain-plant, but it is often confounded with varieties of *L. campestris* with congested inflorescence. From all these it can be readily distinguished by the tapering leaves ending in an acute subulate point quite unlike the obtuse and often swollen leaf-tip of *L. campestris;* also by the spiciform clusters, and by the broad bracts with white membranous margins densely ciliate with long hairs. I cannot agree with Dr. Buchenau in treating it as a variety of the South American *L. racemosa.* That species is a much larger plant, sometimes reaching a height of 2 ft. 6 in., whereas *L. Traversii* very rarely exceeds 14 in., and is usually much less. The breadth of the leaves is also greatly different. In *L. racemosa* they hardly ever exceed $\frac{1}{8}$ in., whereas in *L. Traversii* they frequently reach $\frac{1}{3}$ in. The inflorescence is also larger and more compound in *L. racemosa.*

(Buch.)

8. **L. ulophylla,** *Cockayne and Laing in Trans. N.Z. Inst.* xliii (1911) 366.—Densely tufted, forming small patches. Stems small, slender, strict, 4–8 in. high, rarely more. Leaves mostly at the base of the stem, than which they are much shorter, $1\frac{1}{2}$–$2\frac{1}{2}$ in. long, seldom more than $\frac{1}{2}$ in. broad, straight or curved, convolute, margins and back covered with a scurfy coating of entangled white woolly hairs; cauline leaves, when present, seldom more than one, minute, base sheathing the stem and appressed to it. Inflorescence terminal, of a single ovoid-oblong or almost spherical head $\frac{1}{4}$–$\frac{1}{2}$ in. long. Bracts pale. Capsule dark-chestnut.—L. racemosa *var.* ulophylla *Buchen. in Oesterr. Bot. Zeit.* (1898) 245, *and in Pflanzenr.* Heft 25 (1906) 75; *Cheesem. Man. N.Z. Fl.* (1906) 738.

South Island: Nelson—Clarence Valley, near Fowler's Pass, *T. F. C.* Canterbury—Castle Hill, *T. F. C., Cockayne!* Mount Arrowsmith district, *Cockayne* and *R. M. Laing.* Otago—Lake Wanaka, *Petrie!* 2000–5000 ft. December–February.

A very curious little plant, probably not uncommon in the higher mountain-valleys of the southern half of the South Island. In the first edition of this work I stated my opinion that it was worthy of being ranked as a distinct species, and further study has fully confirmed this view. I was therefore glad to note that Cockayne and Laing, in their report on the Botany of the Mount Arrowsmith District (Trans. N.Z. Inst. xliii (1911) 366) has published it as such.

L. campestris × racemosa
var. ulophylla Buch. 1898.

Family XIX. LILIACEAE.

Perennial herbs, rarely shrubs or trees. Root fibrous, or rhizome tuberous or bulbous or creeping. Stem herbaceous or woody, erect or climbing, tall or scarcely produced beyond the radical leaves. Leaves usually in radical tufts, or crowded at the ends of the stems or branches, or scattered along the branches, very various in size, shape, and texture. Flowers usually regular, hermaphrodite or rarely unisexual, inflorescence very various. Perianth inferior, petaloid; tube long or short; limb 6-lobed or -partite; segments in 2 series, imbricate or rarely valvate. Stamens 6, rarely 3, inserted towards the base of the perianth-segments and opposite to them, rarely hypogynous; filaments free or connate at the base; anthers oblong or linear, 2-celled, versatile. Ovary superior, 3-celled (sometimes imperfectly so in *Astelia*); style usually simple with a small terminal stigma, or more or less deeply divided into 3 stigmatic branches; ovules few or many in each cell, attached to the inner angle, usually anatropous. Fruit a 3-celled (rarely 1-celled) capsule or berry. Seeds 1 or more in each cell, globose or angular or flattened; testa frequently black, crustaceous or membranous; albumen copious, fleshy or horny; embryo small, terete.

A very large and important family, found all over the world, but more abundant in temperate and subtropical regions than in the tropics. It is frequently divided into 3 or 4 separate families, but in a small Flora it seems advisable to avoid extreme subdivision. Genera estimated at 200, species about 2800. The order has many useful species. The onion, leek, garlic, and asparagus are well-known edible plants. Aloes, squills, and sarsaparilla are important medicines. *Phormium* produces one of the strongest of vegetable fibres. Some are dangerous poisons, as white hellebore and meadow-saffron. Among the multitude of showy garden plants it will be sufficient to mention the lily, tulip, hyacinth, asphodel, lily of the valley. Of the 10 genera found in New Zealand, *Phormium* extends to Norfolk Island; *Rhipogonum*, *Herpolirion*, and *Arthropodium* occur in Australia, the latter in New Caledonia as well; *Enargea* in Chile and the Falkland Islands; *Astelia* in Australia, the Pacific islands, and temperate South America; *Bulbinella* in South Africa; the remaining three (*Cordyline*, *Dianella*, and *Iphigenia*) are widely distributed.

A. Fruit a berry.

* Leaves with distant parallel primary veins connected by transverse veinlets.

Tall branching climber. Leaves usually opposite. Flowers racemose or paniculate .. .. 1. RHIPOGONUM.

Stems short, wiry, creeping. Leaves alternate. Flowers solitary or 2–3, axillary .. .. 2. ENARGEA.

** Veins of leaves not connected by transverse veinlets.

Stems woody, usually arborescent. Leaves crowded at the ends of the stem or branches, glabrous. Flowers hermaphrodite; perianth deciduous .. .. 3. CORDYLINE.

Large tufted herbs. Leaves all radical, more or less clothed with silky hairs. Flowers dioecious; perianth persistent .. 4. ASTELIA.

Tufted herbs. Leaves all radical, glabrous. Flowers hermaphrodite; filaments thickened upwards.. .. .. 5. DIANELLA.

B. Fruit a capsule.

Leaves long, narrow, coriaceous. Scape tall, branched above. Perianth tubular, curved.. .. .. 6. PHORMIUM.

Leaves linear, fleshy. Scape stout, naked. Flowers racemose, yellow; filaments naked .. .. 7. BULBINELLA.

Scape stout, with leafy bracts. Flowers panicled, white; pedicels jointed in the middle. Filaments bearded .. .. 8. ARTHROPODIUM.

Small alpine herb. Rhizome creeping. Leaves distichous. Flowers large, solitary, sessile. Style filiform .. .. 9. HERPOLIRION.

Small herbs. Rootstock a tunicate corm. Leaves few. Flower small. Styles 3 .. .. 10. IPHIGENIA.

SMILACACEAE (Hutch. 109)

1. **RHIPOGONUM** Forst. 1776

Tall climbing shrubs, much branched above. Leaves opposite or nearly so, 3–5-nerved with transverse reticulated veins between; petioles without tendrils. Flowers hermaphrodite, small, shortly pedicelled, racemose; racemes axillary or terminal, simple or compound, sometimes forming a terminal panicle. Perianth deciduous; segments 6, all equal or the outer ones shorter. Stamens 6, hypogynous; filaments very short, flattened; anthers erect, longer or shorter than the perianth. Ovary superior, sessile, 3-celled; style short, stout; stigmas 3, thick, recurved; ovules solitary or geminate in each cell. Fruit a globose berry, usually 1-seeded by abortion, rarely 2–3-seeded. Seeds globose; testa thin, appressed; embryo small, remote from the hilum.

In addition to the single species found in New Zealand, there are four others in Australia.

1. **R. scandens** *Forst. Char. Gen.* (1776) 50.—A tall glabrous climber. Stems slender, knotted at the joints, often forming interwoven masses difficult to penetrate. Leaves opposite or very rarely alternate, petiolate, 3–5 in. long, narrow ovate-oblong to oblong-lanceolate, acute or acuminate, coriaceous, 3- or 5-nerved, the intermediate veinlets copiously reticulated. Racemes axillary, simple or branched, 3–6 in. long, the upper ones sometimes forming a terminal panicle. Flowers small, greenish, about $\frac{1}{3}$ in. diam.; pedicels slender, spreading. Perianth-segments very small, oblong-lanceolate, acute. Stamens 6, much longer than the perianth; filaments short, thick; anthers very large, linear-lanceolate. Ovary ovoid-globose; ovules geminate in each cell; style short, thick; stigma large, obsoletely 3-lobed. Berry globose, $\frac{1}{3}$ in. diam., bright-red.—*A. Rich. Fl. Nouv. Zel.* (1832) 151; *Raoul Choix* (1846) 41; *Hook. f. Fl. Nov. Zel.* i (1853) 253; *Handb. N.Z. Fl.* (1864) 281; *Benth. in Hook. Ic. Plant.* t. 1395; *Cheesem. Man. N.Z. Fl.* (1906) 703; *Ill. N.Z. Fl.* ii (1914) t. 200. R. parviflorum *R. Br. Prodr.* (1810) 293; *A. Cunn. Precur.* (1836) n. 305. Smilax Ripogonum *Forst. f. Prodr.* (1786) n. 372.

North and South Islands, Stewart Island, Chatham Islands: Lowland forests from the North Cape southwards, abundant. Sea-level to 2000 ft. *Supplejack; Kareao; Pirita.* November–December.

A familiar plant to all bushmen, especially in the northern part of the Dominion. In the South Island it is mainly found near the coasts. The long, tough, and elastic stems have been used for baskets, hurdles, &c.; and an extract from the root has been employed in the place of sarsaparilla.

PHILESIACEAE (Hutch. 117)

Luzuriaceae Nom. cons. Ruiz et Pav. Fl. Peruv. 3: 62. 1802.

2. **ENARGEA** Banks and Sol. ex Gaertn. 1788

Glabrous almost suffruticose herbs. Stems slender, branched, wiry, knotted at the joints, lower joints with small membranous scales. Leaves alternate, sessile or nearly so, distichous, lanceolate to oblong, prominently nerved. Flowers white, solitary or 2–4 in the axils of the leaves. Perianth deciduous; segments 6, distinct, subequal, spreading, thin, nerveless. Stamens 6, hypogynous; filaments erect; anthers linear-oblong, basifixed, longitudinally dehiscent. Ovary sessile, ovoid, 3-celled; ovules 4–10 in each cell; style filiform; stigma terminal, capitate or obsoletely 3-lobed. Berry subglobose, indehiscent. Seeds few, ovoid or subglobose; testa thin, appressed; embryo short, straight; albumen horny.

In addition to the New Zealand species are two others from Chile. I agree with the late Baron Mueller ("Victorian Naturalist," December, 1886) in considering that *Enargea* should take precedence over both *Callixene* and *Luzuriaga*. *Enargea* was published by Gaertner from Solander's notes in 1788, whereas *Callixene* did not appear until 1789, and *Luzuriaga* in 1802. *Enargea* appears to have been rejected on account of an error in Gaertner's plate, but that does not seem to be a sufficient reason for setting aside the name.

1. **E. parviflora** *Skottsberg in Plant World*, xviii (1915) 133.—Stems slender, branched, wiry, flexuous, creeping at the base, 4–12 in. long or more. Leaves alternate, sessile or very shortly petioled, $\frac{1}{2}$–$1\frac{1}{4}$ in. long, linear-oblong to oblong, mucronate, pale-green, rather rigid, coriaceous, margins perfectly smooth, longitudinally 5–7-nerved; transverse veinlets few; all veinlets conspicuous on both surfaces. Flowers solitary, terminal or in the upper axils, white, $\frac{1}{2}$–$\frac{3}{4}$ in. diam.; pedicels short, slender, erect. Perianth-segments subequal, ovate-lanceolate, acute. Stamens not $\frac{1}{2}$ the length of the segments; filaments glabrous. Berry globose, $\frac{1}{3}$ in. diam., white.—E. marginata *Cheesem. Man. N.Z. Fl.* (1906) 704 (*not of Banks and Sol.*). Callixene parviflora *Hook. f. Fl. Nov. Zel.* i (1853) 254; *Handb. N.Z. Fl.* (1864) 281. C. melalantha *Col. in Trans. N.Z. Inst.* xvii (1885) 250. Luzuriaga parviflora *Kunth Enum. Pl.* v (1850) 281. L. marginata *Cheesem. Ill. N.Z. Fl.* ii (1914) t. 201 (*not of Benth.*).

North and South Islands, Stewart Island: Mountain forests from Cape Colville and the Thames goldfields southwards, not uncommon. Sea-level to 3500 ft. *Puwatawata.* November–February.

In the first edition of this work I followed Bentham in uniting the New Zealand species with the Fuegian and Falkland Islands *E. marginata*. But Dr. Skottsberg, who has recently made a comparison between the two, finds that *E. marginata* has flowers twice as large, and the veins of the leaves are obsolete and their margins scabrous; whereas the New Zealand plant, in addition to the much smaller flowers, has the leaf-margins smooth, and their veins evident. He has consequently revived Hooker's name of *E. parviflora* for our plant.

AGAVACEAE

3. CORDYLINE Comm.

Trees or shrubs; trunk long or short, sometimes almost wanting. Leaves crowded at the top of the stem or its branches, more rarely alternate along the stem, sessile or petioled, very long, coriaceous; veins parallel, more or less oblique to the midrib. Flowers hermaphrodite, in terminal much-branched panicles, solitary or fascicled along the branches, shortly pedicellate or almost sessile. Perianth narrow-campanulate or cylindric, 6-partite; segments narrow, all equal or the 3 inner rather longer. Stamens 6, inserted at the base of the segments, shorter or longer than them; filaments filiform or flattened; anthers narrow-oblong, dorsifixed. Ovary 3-celled; style filiform; stigma capitate or shortly 3-lobed; ovules numerous (4–16) in each cell. Berry globose, 3-celled, at first more or less succulent, but often dry when the seeds are fully ripe. Seeds few or many in each cell, sometimes solitary by abortion, usually curved; testa black, shining.

About 12 or 15 species are known, scattered through India, Malaya, Polynesia, and New Zealand, together with one species in South America. With the exception of the wide-ranging *C. terminalis*, all the species found in New Zealand are endemic.

Cordyline kaspar n.sp. Three Kings Is. 1889
Records Auck. Inst.& Museum.Vol.4.no.6.Oct.56.

A. Leaves contracted into a long and narrow canaliculate petiole.

Leaves 1–2½ ft., broadly oblanceolate or narrow-oblong; lateral veins fine. Panicle 1–2 ft.; branches simple, spreading. Flowers lilac	1. *C. terminalis.*
Leaves 3–6 ft., linear-lanceolate; lateral veins strong, prominent. Panicle 2–5 ft., much branched. Flowers white	2. *C. Banksii.*

B. Leaves sessile, ensiform, not contracted into a conspicuous petiole.

Stem 15–40 ft. Leaves 1½–3 ft. × 1½–2½ in., rather thin; lateral veins fine, green	3. *C. australis.*
Stem 5–20 ft. Leaves 2–6 ft. × 4–6 in., excessively thick and coriaceous; lateral veins coarse, conspicuous, red or yellow ..	4. *C. indivisa.*
Stem wanting or very short. Leaves 1–3 ft. × ¼–⅔ in., narrow-linear	5. *C. pumilio.*

1. **C. terminalis** *Kunth in Abh. Acad. Berl.* (1820) 30.—Stem slender, 3–8 ft. high. Leaves numerous, crowded, 1–2½ ft. long, 2–5 in. broad, broadly oblanceolate or almost oblong, acute or acuminate, gradually narrowed into a long petiole, thinly coriaceous, pale-green, midrib distinct beneath but obscure above; lateral veins numerous, fine, distinct, oblique; petiole 2–6 in. long, deeply canaliculated above, obtusely keeled beneath, dilated and sheathing at the base. Panicle 1–2 ft. long, broad, laxly branched; branches spreading, the lower ones again divided. Flowers solitary or 2–3 together along the branches of the panicle, sessile or very shortly pedicelled, ⅓ in. long, lilac; bracteoles 3, small, deltoid. Perianth-segments equal, longer than the tube. Stamens not exceeding the segments. Berry globose, ⅓ in. diam.—*Benth. Fl. Austral.* vii (1878) 21; *Cheesem. in Trans. N.Z. Inst.* xx (1888) 174; *Man. N.Z. Fl.* (1906) 706. C. Cheesemanii *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 508.

Kermadec Islands: Lower portions of Sunday Island, not common, *T. F. C.* North Island: Formerly cultivated by the Maoris in the Bay of Islands and other northern districts, now nearly extinct. *Ti-pore.* July–September.

A most abundant plant throughout Polynesia, and stretching northwards through Queensland and New Guinea to Malaya and India. I have examined the specimens, cultivated in Mr. Reid's garden at Ahipara, upon which Mr. Kirk founded his *C. Cheesemanii.* They differ in no respect from the common Polynesian form of *C. terminalis,* and as they were found in an abandoned Maori cultivation they can only be looked upon as survivors from a period when the species was grown by the Maoris for food purposes. Archdeacon Walsh (Trans. N.Z. Inst. xxxiii (1901) 201) mentions other instances of *C. terminalis* having been found in old Maori cultivations, and argues with much probability that the plant was originally introduced by the Maoris on their first colonization of New Zealand.

2. **C. Banksii** *Hook. f. in Gard. Chron.* (1860) 792.—Stems slender, simple or sparingly branched, or several from the base forming large clumps, 4–10 ft. high. Leaves numerous, very long, erect below, drooping towards the tips, 3–6 ft. or even more, 1½–3½ in. broad at the middle, linear-lanceolate, acuminate, gradually contracted into a petiole 1–2 ft. long, striate and obliquely many-nerved, 4–8 of the nerves on each side of the midrib stronger than the rest and either green or red or yellowish; midrib stout, flat above, prominent and rounded beneath; petiole deeply channelled above, rounded beneath. Panicles one or several to each stem, suberect or drooping, very large and lax, much and diffusely branched, 2–5 ft. long. Flowers longer and narrower than in *C. australis,* and not so closely placed, nearly ½ in. long, white, sessile or nearly so; bracteoles very small. Berry globose, ½ in. diam., white. Seeds 2–3 in each cell.—*Handb. N.Z. Fl.* (1864) 282; *Cheesem. Man. N.Z. Fl.* (1906) 706.

x.C. matthewsii Carse Trans 57 :91
(C. aust. x pumilio)

× C. Gibbingsae Cockr. Trans 60 : 1929 : 306.
(C. banksii × pumilio)

C. Beuckelaerii *C. Koch Wochen.* viii (1865) 91. C. erythrorhachis *Hort. ex Baker in Journ. Linn. Soc.* xiv (1875) 541. C. diffusa *Col. in Trans. N.Z. Inst.* xv (1883) 330.

North and South Islands: Abundant from the North Cape to Marlborough, Nelson, and Westland. Sea-level to 3500 ft. *Ti-ngahere.* November–December.

A very distinct species, easily recognized by the large many-nerved leaves gradually narrowed into long slender petioles, large lax panicles, and long narrow flowers.

(Forst. f.)

3. **C. australis** *Hook. f. in Gard. Chron.* (1860) 792.—Variable in size and habit. Stems of young trees straight, erect, unbranched; of mature ones much branched above or more rarely from the base, 15–40 ft. high; trunk 1–5 ft. diam.; bark thick, rough and fissured. Leaves of young plants scattered along the stem, 1–2 ft. long, ½–1 in. broad; of older plants forming a dense round head at the top of the stem or branches, 1½–3 ft. long, 1½–2½ in. broad, ensiform, acute or acuminate, contracted just above the broad sheathing base but not petiolate, flat, firm, coriaceous: midrib

rect or
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Flowers
celled;
obtuse,
oblong.
globose,
(1864)
heesem.
9) 381.

C. indivisa *Regel in Gartenfl.* (1859) 331 (*not of Steud.*). C. lentiginosa *Linden and Andre Illustr. Hort.* xvii (1870) t. 35. C. Veitchii *Regel in Gartenfl.* (1871) 149. C. calocoma *Hort. ex Baker in Journ. Linn. Soc.* xiv (1875) 542. C. Forsteri *F. Muell. Select Pl.* (1878) 58. C. Sturmii *Col. in Trans. N.Z. Inst.* xv (1883) 331. Dracaena australis *Forst. f. Prodr.* (1786) n. 151; *A. Rich. Fl. Nouv. Zel.* (1832) 149. Dracaenopsis australis *Planch. in Fl. des Serres* (1850–51) sub. t. 569.

North and South Islands: Abundant throughout. Stewart Island: Rare, *T. Kirk.* Sea-level to 2500 ft. *Ti; Ti-kauka; Ti-rahau; Palm-lily.* November–January.

Universally known to New Zealand residents by the inappropriate name of "cabbage-tree." The foliage yields a strong and durable fibre, and has been recommended for paper-making. Largely planted for scenic effect in gardens and shrubberies, and extensively grown for decorative purposes in Europe. Varieties with bronzy or variegated foliage are occasionally seen. Mr. Colenso's *C. Sturmii* has broader and thinner leaves, and may be entitled to recognition as a variety, but at present I am only acquainted with it through a single indifferent specimen.

4. **C. indivisa** *Steud. Nom.* ed. ii, i (1824) 419.—Stem stout, erect, rarely branched, 5–25 ft. high. Leaves very numerous, spreading all round and forming an enormous massive head, 2–6 ft. long, 4–6 in. broad at the middle, broadly ensiform, acuminate, usually contracted below and again expanded at the sheathing base, excessively thick and coriaceous, flat, greenish with a faint purplish or reddish tint above, glaucous beneath, midrib very thick and prominent at the base, but gradually decreasing in size upwards, lateral veins very numerous, strong, parallel, oblique to the midrib and with it usually coloured red or reddish-yellow. Panicle very large, densely branched, pendulous, 2–4 ft. long including the stout peduncle; bracts at the base

Cordyline kaspar n.sp. Three Kings Is. 1889
Records Auck. Inst.& Museum. Vol.4. no.6. Oct.56.

A. Leaves contracted into a long and narrow canaliculate petiole.

Leaves 1–2½ ft., broadly oblanceolate or narrow-oblong; lateral veins fine. Panicle 1–2 ft.; branches simple, spreading. Flowers lilac .. .. 1. *C. terminalis.*

Leaves 3–6 ft., linear-lanceolate; lateral veins strong, prominent. Panicle 2–5 ft., much branched. Flowers white .. .. 2. *C. Banksii.*

B. Leaves sessile, ensiform, not contracted into a conspicuous petiole.

Stem 15–40 ft. Leaves 1½–3 ft. × 1½–2½ in., rather thin; lateral veins fine, green .. .. 3. *C. australis.*

Stem 5–20 ft. Leaves 2–6 ft. × 4–6 in., excessively thick and coriaceous; lateral veins coarse, conspicuous, red or yellow .. 4. *C. indivisa.*

Stem wanting or very short. Leaves 1–3 ft. × ¼–⅔ in., narrow-linear .. .. 5. *C. pumilio.*

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Cordyline terminalis, Kunth.
not native to N.Z. see T.N.Z.I.
vol. 57, p. 63. (Ckn. & Allan).

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(F. Atl. 2)

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broad, massive, the lower ones usually exceeding the panicle; branches very close-set, divided at the base, simple above, 1 in. across with the flowers on. Flowers shortly pedicelled, densely crowded, $\frac{1}{3}$ in. long, white; bracteoles of the lower flowers sometimes equalling them, of the upper ones minute. Perianth-tube campanulate; segments sharply recurved. Anthers broadly oblong. Berry $\frac{1}{4}$ in. diam., globose, bluish. Seeds 5–6 in each cell, angled; testa black, shining.—*Hook. f. Fl. Nov. Zel.* i (1853) 258; *Gard. Chron.* (1860) 792; *Handb. N.Z. Fl.* (1864) 282; *Cheesem. Man. N.Z. Fl.* (1906) 282; *Cockayne Veg. N.Z.* (1921) t. 36. C. Hookeri *T. Kirk in Trans. N.Z. Inst.* xxv (1893) 334. C. Hectori *Col. in Trans. N.Z. Inst.* xxv (1893) 334. Dracaena indivisa *Forst. f. Prodr.* (1786) n. 150; *Pl. Escul.* (1786) n. 33; *A. Rich. Fl. Nouv. Zel.* (1832) 148; *A. Cunn. Precur.* (1836) n. 301.

North Island: Mountain districts from the Thames goldfields and Te Aroha southwards. South Island: Along the western side from Collingwood and Westport to Dusky Sound. On the eastern side in several localities on Banks Peninsula, *J. B. Armstrong.* 1500–4000 ft. *Toii.* December–January.

By far the finest species of the genus. I have followed Sir J. D. Hooker in considering the plant common in subalpine localities in the North Island and north-west portion of the South Island to be the same as Forster's *Dracaena indivisa*, originally gathered in Dusky Sound. Most New Zealand botanists, however, treat the two forms as distinct, apparently on the ground of the supposed larger and longer flowers of the southern plant. But, so far as I am aware, flowering specimens of Forster's plant do not exist in any New Zealand herbarium, and the earlier descriptions are in conflict with one another as to the size of the flower. As there is little, if any, difference in habit or foliage, it appears to me that the most prudent course is to keep the two plants together until a thorough comparison of their characters can be made.

5. **C. pumilio** *Hook. f. in Gard. Chron.* (1860) 792. — Small, usually stemless, but in some varieties with a short slender stem 1–3 ft. high. Leaves very numerous, densely rosulate, 1–3 ft. long, $\frac{1}{4}$–$\frac{2}{3}$ in. broad, narrow-linear, acuminate, coriaceous; lateral veins several, evident, parallel; midrib stout, prominent on both surfaces; margins often finely scaberulous. Panicles terminal, erect or inclined, very slender, laxly branched, 1–3 ft. long; branches long, slender, spreading. Flowers irregularly scattered along the branches, rather remote, shortly pedicelled, small, white or bluish-white, $\frac{1}{5}$ in. diam.; pedicels variable in length. Perianth-segments oblong, obtuse. Berry globose, $\frac{1}{5}$ in. diam., bluish-white. Seeds 1 or 2 in each cell.—*Handb. N.Z. Fl.* (1864) 282; *Cheesem. Man. N.Z. Fl.* (1906) 708. C. stricta *Hook. f. Fl. Nov. Zel.* i (1853) 257, t. 58 (*not of Endl.*).

North Island: From the North Cape to Wellington, but rare and local to the south of the East Cape. Sea-level to 1500 ft. *Ti-rauriki.* November–December.

A variable plant, but well marked by the small size, usually stemless habit, narrow leaves, lax slender panicle, and small flowers. The roots are fleshy and saccharine, and were formerly cooked and eaten by the Maoris.

4. **ASTELIA** Banks and Sol.

Large or small densely tufted perennial herbs, usually more or less clothed with silky or chaffy hairs or scales. Leaves numerous, linear, all radical or crowded near the base of the stem, with broad imbricate sheathing bases. Flowering stem or scape usually long, panicled above and many-flowered, rarely short and few-flowered, usually densely silky or woolly. Flowers small, dioecious. Perianth persistent, 6-partite; segments subequal, connate at the base into a short hemispherical tube or distinct, spreading or reflexed. Male flowers: Stamens 6, affixed to the base of

the segments; filaments filiform; anthers oblong or linear-oblong. Rudimentary ovary present. Female flowers: Staminodia present. Ovary sessile, broadly ovoid or oblong, 1-celled with 3 parietal placentas, or 3-celled with the placentas in the axis; ovules numerous on each placenta; style very short; stigma 3-lobed. Fruit an indehiscent more or less fleshy oblong or ovoid or subglobose berry. Seeds several, ovoid or oblong, straight or curved, terete or angular; testa black, crustaceous; embryo small, cylindric; albumen fleshy.

A small genus of 15 or 16 species, with its headquarters in New Zealand, but with 1 species in south-eastern Australia and Tasmania, 1 in Fiji, 2 or 3 in the Sandwich Islands, and 1 in antarctic America. In New Zealand it forms a prominent part of the vegetation, especially in the northern forests, to which one or two of the species often give a peculiar aspect. The species are by no means easy of discrimination, partly from a certain amount of similarity in the foliage, and partly from the flowers being dioecious, thus making it difficult to match the sexes. When dealing with fresh specimens these difficulties in great measure disappear, particularly if due attention is paid to the structure of the ovary and the size and shape of the ripe fruit, both of which afford excellent characters. The student will find some valuable remarks on this point in Mr. Kirk's notes on the genus, published in Trans. N.Z. Inst., vol. iv, pp. 241–47. With respect to the remarkable diversity existing in the genus in the placentation of the ovary, reference should be made to the "Flora Antarctica," vol. ii, p. 357.

In the following arrangement I have adopted Hooker's identification of the two species originally described by Cunningham. But Cunningham's diagnoses, such as they are, do not satisfactorily match Hooker's plants, and it has been suggested that he had other species in his mind. The question is one which cannot be settled, if settled at all, without reference to Cunningham's collections, all of which are outside the Dominion, and beyond my reach. But taking into account Hooker's remarks in the "Flora of New Zealand" (vol. i, p. 251), where he says, "Cunningham confused all the species and sexes, examined none, and referred at random to Banks and Solander's drawings and notes, substituting names of his own for theirs," it appears highly doubtful whether such an examination would be at all conclusive. An alteration of the present nomenclature, which has received universal acceptance, would be a matter much to be deplored.

I have had much trouble with the species, 10 in all, described by Colenso in the Trans. N.Z. Inst. Unfortunately, few of them are represented by named specimens in his herbarium; and his descriptions are so vague, and so much overloaded with trivial details, that it is difficult to come to an opinion respecting them. But I can see no grounds for supposing that they are really distinct, or represent anything more than individual differences.

A. Berry 1-celled. Ovules attached to 3 parietal placentas.

Very small, subalpine. Leaves ¾–1 in., terete or canaliculate. Flower solitary .. .. 1. *A. subulata.*

Small, subalpine. Leaves 1–8 in., glabrous or scaly. Scape few-flowered. Berry oblong, ⅓–½ in. long .. .. .. 2. *A. linearis.*

Leaves 2–5 ft. × ½–1 in., glabrous or silky. Scape panicled, many-flowered; female prostrate in fruit. Berry globose, ⅕ in. diam. Seeds terete .. .. 3. *A. Cunninghamii.*

B. Berry 3-celled. Ovules attached to the inner angles of the cells.

* Perianth not enlarged or coloured in fruit.

Leaves 2–6 ft. × ½–1½ in., not conspicuously 3-nerved. Female scape stout, erect in fruit. Flowers ¼ in. long. Berry ⅓ in. long, ovoid, purplish-black. Seeds angled .. .. .. 4. *A. Banksii.*

Leaves 3–6 ft. × ¾–1¾ in., conspicuously 3-nerved and plaited. Female scape prostrate in fruit. Flowers ¼ in. long. Berry ⅓ in. diam., globose, red .. .. 5. *A. trinervia.*

Leaves 2–5 ft. × 1½–2½ in., conspicuously 3-nerved, not plaited. Flowers large, narrow, ½ in. long. Female scape not prostrate in fruit. Berry ⅘ in. diam., globose, red .. .. .. 6. *A. Solandri.*

** Perianth enlarged in fruit, coloured within.

Leaves 2–6 ft. × 1½–4 in., 3-nerved. Flowers ⅓ in. long, dark purplish-green. Female scape very stout, erect in fruit. Berry ovoid-globose, ½–⅔ in. diam., orange-yellow	7. *A. nervosa.*
Leaves 2–3 ft. × 1–1½ in., rigid and coriaceous, silky on both surfaces, often villous	8. *A. Cockaynei.*
Leaves 9–30 in. × ½–1½ in., almost glabrous above, silvery-white beneath. Flowers sunk among the upper foliage-leaves ..	9. *A. Petriei.*
Leaves 6–12 in. × ⅕–¼ in., bronzy to glaucous-green above, shaggy with white tomentum beneath. Flowers sunk among the upper foliage-leaves	10. *A. nivicola.*

1. **A. subulata** *Cheesem. in Subantarct. Is. of N.Z.* ii (1909) 429.—A small densely tufted and compacted little herb, with the habit of *A. linearis* but much smaller. Rhizome long and wiry, wide-creeping, much branched, thickly covered with the decaying bases of the old leaves, and forming with the long stringy roots a closely matted turf from 1 to 3 in. deep or more. Leaves small, ¾–1 in. long, erect or a little curved, pale and sheathing at the base, bright-green and shining above, terete or obscurely canaliculate, cylindric and acute at the tip; sheaths membranous, hyaline, clothed with silvery erect or appressed scales. Scape very short, solitary, terminal. Flower solitary, similar to that of *A. linearis*, but smaller. Fruit unknown.—A. linearis *var.* subulata *Hook. f. Fl. Antarct.* i (1844) 76.

Auckland and Campbell Islands: Wet peaty places on the hills, not uncommon, *Hooker, Cockayne, B. C. Aston! J. S. Tennant! R. M. Laing!* Stewart Island: Fraser Peaks, *Cockayne.*

This differs much in foliage from all states of *A. linearis*, which has leaves from 1–8 in. in length by $\frac{1}{10}$–¼ in. broad, channelled above and keeled below, more or less sulcate or grooved, and with the midrib and margins clothed with narrow hyaline scales. In *A. subulata* the leaves are seldom more than ¾ in. long by $\frac{1}{30}$ in. broad, terete or canaliculate above, smooth and glabrous except the sheaths. I have seen only very imperfect flowering specimens.

2. **A. linearis** *Hook. f. Fl. Antarct.* i (1844) 76.—A small densely tufted herb. Rhizome creeping, branched, clothed with the shaggy bases of the old leaves. Leaves terminating the branches of the rhizome, all radical, crowded, spreading, 1–8 in. long, $\frac{1}{10}$–¼ in. broad, narrow-linear, acute or acuminate, sheathing at the base, thick and coriaceous, nerved, often channelled above, slightly keeled beneath; margins recurved; both surfaces clothed when young with silvery or reddish-brown erect or appressed scales, becoming almost glabrous when old; sheaths broad, appressed, membranous, scarious, thickly covered with narrow hyaline silvery scales. Male flowers: Scape slender, equalling the leaves or shorter than them, simple or forked, 3–9-flowered; bracts 1–2, linear-elongate; pedicels rather long, slender. Perianth-segments silky externally, spreading or reflexed, knobbed at the tip. Filaments much shorter than the segments; anthers oblong. Rudimentary ovary broad, narrowed into a short thick style. Female flowers: Scape very short, almost concealed at the base of the leaves, 1–5-flowered. Perianth-segments longer and narrower, erect. Staminodia present, minute. Ovary large, narrow oblong-ovoid, 1-celled; stigma-sessile, 3-lobed; ovules numerous, attached in 2 series to 3 parietal placentas. Berry large for the size of the plant, ⅓–½ in. long, narrow-oblong, obscurely trigonous, fleshy, red. Seeds obovoid, not angled, smooth, black, shining.—*Handb. N.Z. Fl.* (1864) 284; *Cheesem. Man. N.Z. Fl.* (1906) 710. A. minima *Col. in Trans. N.Z. Inst.* xxviii (1896) 611.

** Perianth enlarged in fruit, coloured within.

ASTELIA according to Skottsberg.
1. Ov. uniloculare. Semina sutteretia vel teretia, piniculo incrassato.
A. Tepala omnino libera.
a. Folia basi lanigera, ceterum squamosa-lanata . . . . . linearis
b. Folia inferne parce pilosa, ceterum glaberrima . . . . . subulata
B. Tepala breviter coalita.
a. Nervuli transversi indistincti vel nulli Tepala apiculata . . . . . solandri
b. Nervuli transverse distinctiores. Tepala caudata . . . . . trinervia
11. Ov. triloculare. Semina rotundato-angulata puniculo minimo.
A. Tepala breviter coalita . . . . . banksii
B. Tepala, praccipue in ♀, tubum campanulatum vel urceolatum.
1. Robustae, foliis rigidis.
a. Lamina eximie tricostata
A lamina 3-7 cm. - . . . . . nervosa
B lamina + 2 cm. - . . . . . Cockaynei
b. Nervorum lateralium duo quam ceteris paulum magis . . . . . Petriei
2. Minus robustae, folia subcoriacea . . . . . .nivicola

ASTELIA: Racemi inferiores (nisi panicala valde reducta) virgati, ramis 1-3 basalibus. Flores ♂ et ♀ structura hand multum dissimiles. Anthe ovoideae-ellipsoideae, dorsifixae, in apice filiformi filamenti mobiles, mox caduceae. Ovarium uniloculare, placentis parietalibus vel axilibus. Lemina laevissima, lucida, pilis longis mucilagineis haud arcte cincta.

triloculare placentis
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North and South Islands, Stewart Island, Auckland and Campbell Islands: Moist ground in subalpine localities from the East Cape and Ruapehu southwards, not uncommon. Usually from 3000 to 5000 ft., but descends to sea-level in Stewart Island and the Auckland Islands. November–January.

3. **A. Cunninghamii** *Hook. f. Fl. Nov. Zel.* i (1853) 259.—A densely tufted species, epiphytic or terrestrial. Leaves numerous, 2–5 ft. long, ½–1 in. broad at the middle, drawn out into a long-acuminate point, contracted below, and then gradually widened into a broad sheathing base, rigid and coriaceous, glabrous or sparingly silky above, clothed with a thin silvery pellicle beneath; midrib and margins silky; nerves 10–12, usually one stronger than the rest on each side of the midrib, or sometimes a prominent bundle of 2–3 placed close together; margins recurved; sheathing base clothed with long dense white silky hairs. Male flowers: Scape 1–3 ft. long, very slender at the base, stouter above, trigonous, shaggy throughout with silky white hairs, panicled above; branches numerous, slender, often flexuous and interlaced; bracts long, leafy. Flowers numerous, small, ⅙ in. long, greenish-yellow or reddish-yellow or maroon. Perianth-segments lanceolate, acuminate, spreading or reflexed, the 3 outer rather larger than the inner. Stamens about ½ as long as the segments; anthers small, broadly oblong. Female flowers: Scape shorter, with a smaller and more closely branched panicle, branches shorter and more erect. Flowers rather smaller; segments not so spreading. Ovary ovoid-globose, 1-celled; ovules attached to 3 parietal placentas. Berry red, globose, ⅕ in. diam. Seeds linear-oblong, curved, terete, not angled.—*Handb. N.Z. Fl.* (1864) 283; *Cheesem. Man. N.Z. Fl.* (1906) 710. A. polyneuron *Col. in Trans. N.Z. Inst.* xiv. (1882) 333. (?) A. graminifolia *Col. l.c.* xix (1887) 267. Hamelinia veratroides *A. Rich. Fl. Nouv. Zel.* (1832) 158, t. 24 (*excl. fig.* c, d).

Var. **Hookeriana** *T. Kirk in Trans. N.Z. Inst.* iv (1872) 244.—Smaller and more slender, seldom exceeding 3 ft. Scape very slender; branches of male panicle seldom interlacing. Flowers rather smaller, claret-coloured. Berry nearly black, placentas very feebly developed.

North Island: Abundant in woods throughout. South Island: Nelson—Near Collingwood, *H. H. Travers;* Westport, *W. Townson!* Charlestown, *T. Kirk!* Sea-level to 3500 ft. *Kowharawhara.* December–January; ripe fruit November–December. Var. *Hookeriana:* Lava-fields on the Auckland Isthmus, Rangitoto Island, Little Barrier Island, &c. April–June; ripe fruit May–June.

Very near to *A. Banksii* in habit and general appearance, but widely differing in the 1-celled ovary and small globose berry with terete seeds. I have quoted A. Richard's *Hamelinia veratroides* as a synonym, his drawing of the female panicle exactly corresponding; but the section of the ovary given is that of *A. Banksii*, probably through some confusion of specimens.

4. **A. Banksii** *A. Cunn. Precur.* (1836) n. 296.—A large densely tufted terrestrial or rupestral species. Leaves very numerous, closely packed, erect, 2–6 ft. long, ½–1½ in. broad at the middle, narrow-linear, tapering into a long-acuminate point, narrowed below and then gradually expanded into a broad sheathing base, glabrous or slightly scurfy above, clothed with a thin silvery pellicle beneath, with 3–6 distinct and equally prominent nerves on each side of the midrib; margins recurved; sheathing base most densely clothed with long soft silky hairs. Male flowers: Scape slender at the base, stouter above, trigonous, excessively shaggy with dense white silky hairs, panicled; branches numerous, slender, often flexuous, 4–9 in. long; bracts at the base leafy, with long slender points. Flowers

many, about ¼ in. long; perianth-segments ovate-lanceolate, acuminate, spreading, the 3 outer larger than the inner. Stamens shorter than the segments; filaments subulate; anthers oblong. Female flowers: Scape shorter and stouter; branches shorter, crowded, more erect. Flowers smaller; perianth-segments ovate-oblong, acute, erect. Ovary ovoid-conical, 3-celled; ovules pendulous from the inner angle of each cell; stigmas 3, sessile. Berry ovoid, ⅓ in. long, purplish-black when fully ripe, reddish-purple when immature. Seeds sharply angled; testa black.—*Raoul Choix* (1846) 40; *Hook. f. Fl. Nov. Zel.* i (1853) 260; *Handb. N.Z. Fl.* (1864) 284; *Cheesem. Man. N.Z. Fl.* (1906) 711.

Rec. C.M. 4: 1935: 111

North Island: From the North Cape to Hawke's Bay and Taranaki; usually near the coast. South Island: Vicinity of Westport, *W. Townson!* Sea-level to 2500 ft. April; ripe fruit February–March.

Usually taller and stouter than *A. Cunninghamii*, with larger broader leaves, larger flowers, and much stouter female scape, erect in fruit. The ovary is essentially different, being 3-celled, with the ovules attached to the inner angles of the cells; and the large ovoid berry, with its angled seeds, is altogether unlike the small globose one of *A. Cunninghamii*, with its terete seeds. It is an abundant plant on the coast-line of the northern half of the North Island, often forming a large portion of the undergrowth on wooded headlands or steep declivities near the sea.

5. **A. trinervia** *T. Kirk in Trans. N.Z. Inst.* iv (1872) 246.—A large densely tufted terrestrial species. Leaves numerous, 3–6 ft. long or even more, ¾–1¾ in. broad at the middle, tapering into a long attenuated point, narrowed below and then gradually expanded into a broad sheathing base, not so coriaceous as in *A. Banksii*, pale-green, plaited, glabrous above, clothed with a thin silvery pellicle beneath, conspicuously 3-nerved with less evident nerves between; margins broadly recurved; sheathing base clothed with long white silky hairs. Male flowers: Scape long, slender, densely shaggy with white silky hairs, panicled; branches slender, exuous and often interlaced, 6–12 in. long or more; bracts large, foliaceous. Flowers numerous, ¼ in. long; perianth-segments lanceolate, acuminate, spreading. Stamens shorter than the segments; filaments slender; anthers oblong. Female flowers: Scape as in the male but panicle smaller with fewer, shorter, and more erect branches. Flowers smaller; perianth-segments shorter, erect. Ovary globose, 3-celled; ovules pendulous from the inner angles of the cells; stigmas 3, sessile. Fruiting-scape usually prostrate. Berry globose, ⅓ in. diam., bright-red. Seeds sharply angled, testa black.—*Cheesem. Man. N.Z. Fl.* (1906) 712; *Cockayne Veg. N.Z.* (1921) t. 30. see Skotts. l.c. p. 63.

North Island: In woods from the North Cape to Wellington, very plentiful north of the East Cape and Taupo. South Island: Marlborough—Rai Valley, *J. H. Macmahon!* vicinity of Westport, *W. Townson!* Sea-level to 3000 ft. *Kauri-grass.* March–May; ripe fruit February and March.

Separated from *A. Banksii* by the larger size and less rigid habit, broader and softer pale-green conspicuously 3-nerved and plaited leaves, prostrate fruiting-scape, and red globose berry. It is an abundant and conspicuous plant in the kauri forests of the North Auckland Peninsula, often forming a considerable proportion of the undergrowth. It is seldom seen on trees.

6. **A. Solandri** *A. Cunn. Precur.* (1836) n. 297.—Large, densely tufted, often forming immense clumps on the limbs and trunks of forest-trees or on rocks. Leaves very numerous, spreading and recurved, 2–5 ft. long, 1½–3 in. wide at the middle, linear-ensiform, narrowed above into a long acuminate point, suddenly expanded below into a sheathing base sometimes 4–5 in. across, conspicuously 3-nerved, glabrous and deeply channelled in

front, keeled and with a thin white silvery pellicle beneath ; sheathing base black, at the extreme base white and fleshy, glabrous or clothed with copious long white silky hairs. Male flowers : Scape stout, much shorter than the leaves, densely silky below, paniculed ; branches few, 5–8, simple, 3–9 in. long, 1 in. broad with the flowers on ; bracts at the base of the branches very large, leafy, acuminate. Flowers very numerous, densely crowded, $\frac{1}{2}$ in. long, pale lemon-yellow ; pedicels slender, $\frac{1}{4}$ in., each subtended by a linear bract. Perianth 6-partite ; segments reflexed, linear, obtuse, silky externally. Stamens as long as the segments ; anthers linear, erect, sagittate at the base. Female flowers : Scape [illegible] ed as in
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[illegible], dark-green or greenish-black. Male flowers : Scape very stout, erect or inclined, 6 in. to 2 ft. long, thickening upwards to the base of the panicle, where it is sometimes $1\frac{1}{2}$ in. diam., obtusely triquetrous ; lower portion shaggy with copious long silky hairs ; upper part silky or glabrate. Panicle 4–15 in. long, much-branched ; bracts very long, lanceolate, gradually narrowed upwards into long attenuated points. Flowers $\frac{1}{3}$–$\frac{1}{2}$ in. diam. ; pedicels $\frac{1}{10}$–$\frac{1}{6}$ in. long. Perianth-segments ovate-lanceolate, spreading, ultimately reflexed. Stamens as long as the segments ; filaments subulate ; anthers broadly oblong. Female flowers : Scape as in the male, but shorter ; panicle much shorter and more compact ; branches fewer, short, stiff, erect. Flowers smaller, crowded ; pedicels very short. Perianth-segments smaller. Ovary broadly conical, faintly grooved, 3-celled ; ovules

many, about $\frac{1}{4}$ in. long; perianth-segments ovate-lanceolate, acuminate, spreading, the 3 outer larger than the inner. Stamens shorter than the segments; filaments subulate; anthers oblong. Female flowers: Scape shorter and stouter; branches shorter, crowded, more erect. Flowers smaller; perianth-segments ovate-oblong, acute, erect. Ovary ovoid-conical, 3-celled; ovules pendulous from the inner angle of each cell; stigmas 3, sessile. Berry ovoid, $\frac{1}{3}$ in. long, purplish-black when fully ripe, reddish-purple when immature. Seeds sharply angled; testa black.—*Raoul Choix* (1846) 40; *Hook. f. Fl. Nov. Zel.* i (1853) 260; *Handb. N.Z. Fl.* (1864) 284; *Cheesem. Man. N.Z. Fl.* (1906) 711.

COLLOSPERMUM Skottsberg.

Racemi omnes simplices. Flores ♂ quam ♀ valde majores, tepalis longissimis tenuissimis. Antherae lineares sagittatae, basifixae, immobi es, persistentes. Ovarium triloculare, placentis in dissepimentorum parte interiore evolutis. Semina plerunque pilis mucilaginosi e funiculo ortis usque ad maturitatom cineta.

1. Majusculae, foliis 6, 5-1 m. et ultra.
   A. Folia 72 cm. lata . . . . . hastatum
   B. Folia 1-1.5 cm. lata . . . . microspermum
11. Nana, foliis 10-30 cm. longis . . . . . spicatum

May; ripe fruit February and March.

Separated from *A. Banksii* by the larger size and less rigid habit, broader and softer pale-green conspicuously 3-nerved and plaited leaves, prostrate fruiting-scape, and red globose berry. It is an abundant and conspicuous plant in the kauri forests of the North Auckland Peninsula, often forming a considerable proportion of the undergrowth. It is seldom seen on trees.

6. **A. Solandri** *A. Cunn. Precur.* (1836) n. 297.—Large, densely tufted, often forming immense clumps on the limbs and trunks of forest-trees or on rocks. Leaves very numerous, spreading and recurved, 2–5 ft. long, $1\frac{1}{2}$–3 in. wide at the middle, linear-ensiform, narrowed above into a long acuminate point, suddenly expanded below into a sheathing base sometimes 4–5 in. across, conspicuously 3-nerved, glabrous and deeply channelled in

front, keeled and with a thin white silvery pellicle beneath ; sheathing base black, at the extreme base white and fleshy, glabrous or clothed with copious long white silky hairs. Male flowers : Scape stout, much shorter than the leaves, densely silky below, panicled ; branches few, 5–8, simple, 3–9 in. long, 1 in. broad with the flowers on ; bracts at the base of the branches very large, leafy, acuminate. Flowers very numerous, densely crowded, $\frac{1}{2}$ in. long, pale lemon-yellow ; pedicels slender, $\frac{1}{4}$ in., each subtended by a linear bract. Perianth 6-partite ; segments reflexed, linear, obtuse, silky externally. Stamens as long as the segments ; anthers linear, erect, sagittate at the base. Female flowers : Scape stout, branched as in the male ; but branches longer and more slender, sometimes 12–14 in. long by $\frac{3}{4}$ in. diam., usually drooping in fruit. Flowers much smaller ; perianth with a hemispherical tube closely surrounding the ovary ; segments reflexed. Ovary globose, 3-celled ; ovules numerous, attached to the inner angles of the cells. Berry rather small, $\frac{1}{5}$ in. diam., globose, bright-red. Seeds small, obovoid, slightly curved, not angled, black.—*Raoul Choix* (1846) 40 ; *Hook. f. Fl. Nov. Zel.* i (1853) 260 ; *Handb. N.Z. Fl.* (1864) 284 ; *Bot. Mag.* t. 5503 ; *Cheesem. Man. N.Z. Fl.* (1906) 712 ; *Cockayne Veg. N.Z.* (1921) t. 27, 29. A. microsperma *Col. in Trans. N.Z. Inst.* xvii (1885) 251. A. albicans *Col. l.c.* 252. A. hastata *Col. l.c.* xix (1887) 265.

North Island : Abundant in forests throughout. South Island : Marlborough—Queen Charlotte Sound, *Banks* and *Solander ;* Pelorus Valley, *J. Rutland, J. H. Macmahon !* Nelson—Common on the West Coast, from Collingwood and Westport southwards. Sea-level to 3000 ft. *Kahakaha.* January–February.

A very distinct species, at once known by the broad almost glabrous 3-nerved leaves with a nearly black sheathing base, by the densely placed flowers, the males being much longer and narrower than in any other species, and by the small red globose berry. It is a conspicuous plant in all the forest districts of the North Island, from its habit of growing perched high up on the limbs of tall forest-trees, where it forms huge tufts resembling the nests of some gigantic bird, for which, in fact, it was mistaken when first seen by Cook and his officers in 1769.

7. **A. nervosa** *Banks and Sol. ex Hook. f. Fl. Nov. Zel.* i (1853) 260.—A large and stout densely tufted plant, often forming extensive masses in moist forests or swampy ground. Leaves very numerous, spreading, 2–5 ft. or even up to 8 ft. long, 1–3 in. broad, or in large specimens as much as 4 in., linear-lanceolate or linear-ensiform, tapering upwards into an acuminate point, dilated at the sheathing base, coriaceous, many-nerved, one nerve on each side stouter than the rest and with the midrib often coloured red or purplish-red ; glabrous above or rarely silky, beneath more or less scurfy or clothed with silky appressed hairs, rarely nearly glabrous ; margins recurved, usually silky ; sheathing base densely villous with long silky hairs. Flowers sweet-scented, dark-green or greenish-black. Male flowers : Scape very stout, erect or inclined, 6 in. to 2 ft. long, thickening upwards to the base of the panicle, where it is sometimes $1\frac{1}{2}$ in. diam., obtusely triquetrous ; lower portion shaggy with copious long silky hairs ; upper part silky or glabrate. Panicle 4–15 in. long, much-branched ; bracts very long, lanceolate, gradually narrowed upwards into long attenuated points. Flowers $\frac{1}{3}$–$\frac{1}{2}$ in. diam. ; pedicels $\frac{1}{10}$–$\frac{1}{6}$ in. long. Perianth-segments ovate-lanceolate, spreading, ultimately reflexed. Stamens as long as the segments ; filaments subulate ; anthers broadly oblong. Female flowers : Scape as in the male, but shorter ; panicle much shorter and more compact ; branches fewer, short, stiff, erect. Flowers smaller, crowded ; pedicels very short. Perianth-segments smaller. Ovary broadly conical, faintly grooved, 3-celled ; ovules

many, attached to the inner angles of the cells. Berry globose or ovoid-globose, usually pointed at the tip, $\frac{1}{3}$ in. diam., bright orange-yellow. Fruiting-perianth cup-shaped, thin when ripe, coloured yellow within. Seeds 2–5 to each cell, smooth, black, sharply angled.—*Hook. f. Handb. N.Z. Fl.* (1864) 284; *Cheesem. Man. N.Z. Fl.* (1906) 713. A. grandis *Hook. f. ex T. Kirk in Trans. N.Z. Inst.* iv (1872) 245. A. fragrans *Col. in Trans. N.Z. Inst.* xv (1883) 333.

var. grandis (Hk.f. ex T. Kirk) C.+A. Trans. 56: 1926: 21

North and South Islands, Stewart Island: From the Bay of Islands southwards, abundant. Sea-level to 3000 ft. October–January.

var. sylvestris C.+A. l.c.

The most widely distributed species in New Zealand. Its nearest ally is *A. Cockaynei*, from which it cannot be separated by any strict line of demarcation. Ordinarily, however, *A. Cockaynei* can be distinguished by the smaller size and much more rigid leaves, which are usually silky on both surfaces, and occasionally even villous. In foliage *A. nervosa* approaches *A. trinervia*, but from that plant, and from all the large-leaved species, it is at once removed by the fruiting-perianth being enlarged and coloured within.

8. **A. Cockaynei** *Cheesem. n. comb.*—Very closely allied to *A. nervosa*, and possibly only a subalpine state, but smaller in all its parts, and with the foliage much more rigid and silky. Leaves numerous, 2 ft. 6 in. long or more, $1\frac{1}{3}$–$1\frac{1}{2}$ in. broad, linear or linear-ensiform, gradually narrowed into long acuminate points, dilated at the sheathing base; midrib stout, prominent beneath; half-way between the midrib and the margin is a stout rib composed of 2 almost coalescent veins; ribs often coloured red or purplish-red; upper surface of leaf usually with a thin easily detached silvery pellicle, and generally more or less clothed with silky appressed hairs, sometimes almost villous; under-surface paler, more or less scurfy, generally covered with white appressed scales or hairs, which are most plentiful along the margins; veins numerous, evident; sheathing base of leaves densely covered with long appressed silvery-white or tawny hairs. Flowers very similar to those of *A. nervosa*, but the panicles much smaller and with fewer branches, and the females much more compact. Berry ovoid or ovoid-globose, pointed at the tip, $\frac{1}{3}$ in. diam., fleshy, reddish-orange, enclosed in the persistent cup-shaped enlarged base of the perianth, which is often but not invariably coloured red within. Seeds 2–3 in each cell, black, angled.—A. nervosa *var.* montana *T. Kirk in Cheesem. Man. N.Z. Fl.* (1906) 714. A. montana *Cockayne in Bot. Survey Tongariro* (1908) 36 (*not of Seem.*).

North and South Islands, Stewart Island: Abundant in subalpine localities from Hikurangi, Mount Egmont, and Taupo southwards. 2500–5000 ft. December–January.

There can be no doubt that a direct passage can be traced from *A. Cockaynei* into *A. nervosa*. On the mountains of north-west Nelson I have several times satisfied myself on this point, and Mr. Petrie has come to the same conclusion as regards the Tararua Mountains (Trans. N.Z. Inst. xl (1908) 293–94). But the difference between the extreme state of *A. Cockaynei*, with its low tufts of greyish-white foliage shaggy from the abundance of silky hairs, and the highly developed form of *A. nervosa* formerly known as *A. grandis*, in which the leaves are almost glabrous, and frequently reach a height of 8 ft., with a width of over 4 in., is so pronounced that I cannot refuse to separate the two plants.

9. **A. Petriei** *Cockayne in Trans. N.Z. Inst.* xxxi (1899) 419.—Densely tufted, forming large patches in damp alpine meadows. Leaves 9–30 in. long, $\frac{1}{2}$–$1\frac{1}{2}$ in. broad, linear-ensiform or linear-subulate, gradually narrowed into a long acuminate point, expanded at the sheathing base, rigid and

coriaceous, pale-green and shining above, silvery-white beneath; veins conspicuous on both surfaces. Upper surface almost glabrous when mature, in the young leaves sparingly clothed with minute scurfy scales; under-surface with the spaces between the veins filled with a coating of silvery-white scales; basal sheaths white and fleshy at the base. Inflorescence consisting of a short stiff erect panicle 2–4 in. long sunk amongst the upper foliage-leaves, with few short branches subtended by broad bracts narrowed into long acuminate points. Flowers immature in my specimens, but the males are described by Cockayne as "crowded, very shortly pedicelled, strongly scented, semi-erect; perianth-segments linear or ligulate, purplish and yellow at the base; filaments stout; anthers black." The female inflorescence is said to be "shorter than the male; perianth-segments ovate, acute, sometimes trifid, pilose at the apex." Mature fruit not seen.

South Island: Nelson—Buckland Peaks, *Petrie!* Canterbury—Mount Peel, *H. H. Allan!* Mount Rolleston, *Cockayne!* Walker's Pass, *R. Brown* and *Cockayne.* Westland—Kelly's Hill, *Petrie* and *Cockayne.* Otago—Humboldt Mountains, *Cockayne;* Lake Harris Saddle, *W. A. Thomson!* Altitudinal range from 3500 to 4500 ft.

A very remarkable little plant, the exact systematic position of which must remain doubtful until perfect flowers and fruit have been obtained. Mr. W. A. Thomson, who has supplied me with good specimens of the foliage, informs me that it blooms very seldom, and Mr. H. H. Allan and Dr. Cockayne make the same observation.

10. **A. nivicola** *Cockayne n. sp. ined.*—A tufted herb forming extensive patches in moist alpine hollows. Leaves 6–12 in. long, $\frac{1}{5}$–$\frac{1}{4}$ in. broad at the middle, coriaceous but flexible, gradually tapering upwards into an acute apex, keeled towards the base and stem-clasping, and then suddenly expanded into a thin and membranous almost transparent sheath; upper surface pale bronzy-green to glaucous-green, covered with a membranous pellicle or more or less silky-tomentose; under-surface clothed with thin shaggy or villous whitish tomentum; veins variable in number, usually about 6 on each side of the rather slender midrib, which is sunken above but prominent beneath. Flowers not seen. Fruiting-panicle (one specimen alone seen) very short, $\frac{3}{4}$ in. long and about as wide, nearly sessile among the bases of the uppermost leaves; branches few, short, densely compacted. Berry apparently ovoid-globose, $\frac{1}{4}$–$\frac{1}{3}$ in. long, reddish-orange, sunk in the persistent base of the perianth.

South Island: Mount Cook district, altitude 4500 ft. and upwards, *Cockayne!*

I am indebted to Dr. Cockayne for two specimens of this curious little plant, accompanied by MSS. notes, of which I have availed myself in drawing up the above description. This will probably need amendment when a full suite of specimens has been obtained.

5. **DIANELLA** Lam.

Glabrous perennial herbs. Rootstock often branched. Leaves numerous, crowded at the base of the stem, linear, distichous, equitant and sheathing at the base. Flowers pedicellate, nodding, laxly cymose; cymes arranged in a broad open terminal panicle. Perianth marcescent; segments 6, distinct, spreading. Stamens 6, hypogynous, or the 3 inner affixed to the base of the segments; filaments thickened; anthers erect or recurved, basifixed, opening by terminal pores or short longitudinal slits. Ovary sessile or shortly stalked, 3-celled; ovules 4–8 in each cell;

See Skottsberg. Occ. Papers B.P. Bish. Mus. XIII (18) 1937 : 234.
" Medd. Göt Bot. Trad XV p. 338.

style filiform; stigma minute. Fruit a globose berry. Seeds few, ovoid or compressed; testa black, smooth and shining; albumen fleshy; embryo small, linear.

Species 11 or 12, chiefly Australian, but found also in New Zealand, Polynesia, tropical Asia, and the Mascarene Islands. The single New Zealand species extends to Norfolk Island and several parts of Polynesia.

1. **D. intermedia** *Endl. Prodr. Fl. Ins. Norfolc.* (1833) 28.—Rhizome stout, woody, creeping, usually with underground runners. Leaves numerous, crowded at the top of the rhizome, distichous and sheathing at the base, 1½–3 ft. long or more, ½–¾ in. wide, narrow linear-ensiform, acute or acuminate, keeled, margins and keel minutely scabrid. Panicle 6–24 in. long, much branched; peduncles and pedicels slender, the latter curved. Flowers small, ¼–⅓ in. diam.; greenish or purplish-white. Perianth-segments oblong, spreading; the 3 outer usually 5–6-nerved; the 3 inner rather broader, 3-nerved. Filaments expanded into a yellow or orange struma often thicker than the anther; anther linear-oblong, yellow. Berry ½–¾ in. long, broadly oblong, bright-blue.—*A. Cunn. Precur.* (1836) n. 300; *Raoul Choix* (1846) 40; *Hook. f. Fl. Nov. Zel.* i (1853) 255; *Handb. N.Z. Fl.* (1864) 283; *Cheesem. Man. N.Z. Fl.* (1906) 715. D. nigra *Col. in Trans. N.Z. Inst.* xvi (1884) 339. D. reflexa *Col. l.c.* xxvii (1895) 396.

var. norfolkensis n.var. Brown : Kauri Gulch - acc. paper. Bish. Mus. IX 4 : 1930

North and South Islands: From the Three Kings Islands and the North Cape to Foveaux Strait, abundant. Sea-level to 2500 ft. *Turutu.* November–December.

Allan. TNZI. 76 (1947) 594 Skottsberg - XIII 18 (1937) 254

6. **PHORMIUM** Forst. 1776 J.R.A.G. p. 47. t. 24

Tall rigid and coriaceous herbs. Rhizome short, stout, branched, with thick and fleshy perpendicular rootlets. Leaves all radical, long, linear-ensiform, equitant and distichous, exceedingly tough and coriaceous. Flowering stem or scape tall, leafless, with alternate bracteate branches at the top; bracts caducous. Flowers pedicelled on the branches of a terminal panicle, dull-red or yellow; pedicels jointed. Perianth tubular, curved; segments 6, connate at the base, free but connivent above; the 3 outer lanceolate, erect, acute; the 3 inner rather longer, with spreading tips. Stamens 6, inserted at the base of the segments and longer than them; filaments filiform; anthers linear-oblong. Ovary sessile, oblong, obtusely trigonous, 3-celled; style slender, equalling or exceeding the stamens, declinate; stigma small, capitate; ovules numerous in each cell. Capsule subcoriaceous or almost membranous, oblong or linear, trigonous or almost terete, straight or twisted, loculicidally 3-valved. Seeds many, oblong, greatly compressed; testa black, shining.

Phormium, or the "New Zealand flax," is a very remarkable genus of 2 species, confined to New Zealand and Norfolk Island. Its value as producing one of the strongest and most durable fibres of the vegetable kingdom is too well known to require recapitulation here.

Leaves 3–9 ft., dark-green, glaucous beneath; margins usually bordered with a coloured line. Flowers dull-red. Capsule short, erect or inclined, trigonous, 2–4 in. long	1. *P. tenax.*
Leaves 2–5 ft., pale-green, less rigid; margins seldom coloured. Flowers yellowish. Capsule long, pendulous, cylindrical, terete, twisted, 4–7 in. long	2. *P. Colensoi.*

1. **P. tenax** *Forst. Char. Gen.* (1776) 48.—Leaves 3–9 ft. long or more, 2–5 in. broad, linear-ensiform, acute or acuminate, apex slit when mature, distichous and equitant at the base, flat above, keeled, very tough and coriaceous, dark-green above, often glaucous beneath, margins and midrib bordered with a red or orange line. Scape very variable in height, 5–15 ft., glabrous, terete, reddish-purple. Flowers numerous, 1–2 in. long, usually dull-red. Inner perianth-segments erect or slightly recurved at the tip. Capsule erect or inclined, stout, trigonous, 2–4 in. long, not twisted.—*A. Rich. Fl. Nouv. Zel.* (1832) 153; *A. Cunn. Precur.* (1836) n. 304; *Raoul Choix* (1846) 41; *Hook. f. Fl. Nov. Zel.* i (1853) 256; *Handb. N.Z. Fl.* (1864) 286; *Cheesem. Man. N.Z. Fl.* (1906) 716.

North and South Islands, Stewart Island, Chatham Islands, Auckland Islands: Abundant throughout, especially in lowland swamps and alluvial grounds. Sea-level to 4500 ft. *New Zealand Flax; Harakeke; Korari* (the scape); *Muka* (the fibre). November–January.

A familiar plant to all residents in New Zealand, and, with the exception of certain well-known timber-trees, probably of more economic importance than any other indigenous species. For information as to its value as a fibre-plant, and for full particulars as to the mode of preparing the fibre, its microscopical and chemical properties, &c., reference should be made to "*Phormium tenax* as a Fibrous Plant," edited by Sir James Hector, and issued by the Geological Survey Department (second edition, Wellington, 1889). This publication also contains a bibliography of the numerous official reports, memoirs, and short papers which have been published from time to time in reference to *Phormium*, several of them containing much valuable information.

P. tenax varies much in size, the colour of the leaf and the extent to which it is recurved and split at the tip, the tint of the coloured line bordering the margins and midrib, the colour of the flowers, and the size of the capsule. Some of the varieties also differ considerably in the strength of the fibre. Considering the economic importance of the plant, it is singular that few systematic attempts have been made to collect the whole of the varieties and cultivate them side by side in one at least of the public gardens of the Dominion. Until this is done it is practically impossible to describe them in a scientific manner. Isolated descriptions of a few, without comparison with the rest, would be of little use. Some varieties with the leaves variegated in a riband-like manner with white or creamy-yellow, and others with bronzy or purplish foliage, are largely cultivated for ornamental purposes, but are not usually capable of being reproduced by seed.

2. **P. Colensoi** *Hook. f. in Raoul Choix* (1846) 41.—Much smaller and less rigid than *P. tenax*. Leaves 2–5 ft. long, rarely more, 1–2½ in. broad, acuminate, apex sometimes conspicuously split, but usually much less so than in *P. tenax*, pale-green, seldom glaucous, margins and midrib not usually bordered with a coloured line. Scape 2–7 ft. high, much more slender and with a smaller panicle, green. Flowers 1–1½ in. long; the outer segments yellow or yellowish-red, the inner green or greenish-yellow, with evidently recurved tips. Capsule long, pendulous, cylindrical, terete, twisted, 4–7 in. long.—*Hook. f. Handb. N.Z. Fl.* (1864) 286. P. Cookianum *Le Jolis in Bull. Soc. Hort. Cherb.* (1848) 71, *and in Lond. Journ. Bot.* vii (1848) 536; *Cheesem. Man. N.Z. Fl.* (1906) 716. P. Hookeri *Gunn. in Bot. Mag.* (1888) t. 6973.

North and South Islands, Stewart Island: Not uncommon from the North Cape southwards. Sea-level to 4500 ft. *Mountain-flax; Whaririki.* November–January.

The small size, pale colour, yellowish flowers, and long twisted capsules distinguish this from *P. tenax;* but it is in some respects an ill-defined species, including several forms respecting which additional information is required. One of these, figured in the "Botanical Magazine" under the name of *P. Hookeri*, is remarkable for its flaccid much-recurved leaves with long fissured tips. Sir J. D. Hooker considers that it is more different from *P. tenax* and *P. Colensoi* than they are from one another; but his plate

shows the floral characters to be very similar to those of *P. Colensoi*. A curious sport discovered by the late Bishop Williams at Blackhead, Taranaki, and described by him in Trans. N.Z. Inst., xxxvi (1904), 333, t. 25, is remarkable from the flowers being either accompanied by clusters of leafy bracts or altogether replaced by them. A plant grown in my own garden produced these leafy bracts, many of which were 18 in. long, for 4 or 5 years in succession, but in one year only did flowers appear as well.

Chrysobactron Hook.

7. BULBINELLA Kunth. 1843

Perennial herbs. Rootstock short, stout, with numerous fleshy almost tuberous roots. Leaves all radical, numerous, linear, sheathing at the base, often fleshy. Scape simple or very rarely branched, naked, terminating in a dense many-flowered raceme. Flowers rather small, yellow or white. Perianth marcescent, 6-partite; segments subequal, distinct or slightly connate at the base, 1-nerved. Stamens 6, hypogynous or adnate to the base of the segments; filaments subulate-filiform; anthers versatile. Ovary subglobose, 3-celled; style filiform; stigma small, capitate, obscurely 3-lobed; ovules 2 in each cell. Capsule broadly ovoid or subglobose, membranous, 3-celled, loculicidally 3-valved. Seeds few, often compressed and triquetrous; testa black.

About 16 species are known, all confined to South Africa with the exception of the three described herein. In my memoir on the Systematic Botany of the Islands to the South of New Zealand (p. 464) I have expressed the opinion that Hooker's genus *Chrysobactron* should be revived for the purpose of receiving the New Zealand species; and I am not at all sure that this course will not be ultimately adopted. So far, however, I find that the two groups are not separated by very pronounced characters, and I therefore postpone making any change until a careful investigation can be made.

* Flowers dioecious.

Tall and stout. Leaves often 2 in. broad. Scape 2–3 ft. high .. 1. *B. Rossii.*
Much smaller. Leaves ensiform, 5–9 in. long, ½–1 in. broad. Scape 6–12 in. .. .. 2. *B. Gibbsii.*

** Flowers hermaphrodite.

Slender, usually 1–2½ ft. high; leaves ⅛–¾ in. broad .. .. .. 3. *B. Hookeri.*

(Hook.f.) Bak.

1. **B. Rossii** *Benth. and Hook. f. Gen. Plant.* iii (1880) 784.—A stout perennial herb 9 in. to 3 ft. high; stems sometimes 1½ in. diam. at the base. Leaves numerous, all radical, outer spreading or recurved, inner ascending, 6 in. to 2 ft. long, ½–2 in. broad, broadly ensiform, obtuse or subacute, fleshy, glabrous, concave above, finely striate. Scape stout, erect, terete, ¼–⅓ in. diam. Raceme very stout and dense, 3–6 in. long, 1–2½ in. diam. Flowers numerous, very densely crowded, bright-yellow, polygamo-dioecious, ⅓ in. diam.; pedicels slender, erect, ½–¾ in. long; bracts lanceolate. Perianth-segments linear-oblong or oblong-ovate, obtuse, spreading in the male flowers, more erect in the female. Stamens of the male flowers shorter than the segments; filaments subulate, terete, glabrous; anthers oblong. Ovary of the females broadly ovoid; style short, stout; stigma small, obscurely lobed. Capsule ¼–⅓ in. long, broadly ovoid. Seeds usually 2 in each cell, trigonous; testa black, shining.—*Cheesem. Man. N.Z. Fl.* (1906) 717. Chrysobactron Rossii *Hook. f. Fl. Antarct.* i (1844) 72, tt. 44, 45. Anthericum Rossii *Hook. f. Handb. N.Z. Fl.* (1864) 285.

Auckland and Campbell Islands: Abundant. December–January.

A most magnificent plant, excellently figured and described in the "Flora Antarctica." Sir J. D. Hooker states that he has seen a specimen between 3 ft. and 4 ft. high, having 3 crowns of leaves, and bearing no less than 7 racemes of flowers. In some localities on Campbell Island it forms so large a proportion of the vegetation, and the golden-yellow flowers are so abundantly produced, that its presence can be observed at a distance of more than a mile from the shore.

Bulbine in D.Z. acc. to Hutch. p. 88

(Gen.) Cheesm.

2. **B. Gibbsii** *Cockayne Bot. Survey Stewart Is.* (1909) 42.—A perennial herb 5–12 in. high, similar to *B. Rossii*, but much smaller in all its parts; stems seldom more than ½ in. diam. at the base. Leaves numerous, all radical, outer spreading and recurved, inner more erect, 5–9 in. long, seldom more, ½–1 in. broad, broadly ensiform, gradually tapering upwards into a narrow subacute or obtuse tip, fleshy, glabrous, concave above, convex beneath. Scape exceeding the leaves, 5–12 in. long, much more slender than in *B. Rossii*, terete. Racemes not remarkably dense, 2–3½ in. long; pedicels ¾ in., rarely more. Flowers polygamo-dioecious, much as in *B. Rossii*, but smaller and not so brightly coloured.—Chrysobactron Gibbsii *Cockayne N.Z. Plants and their Story* (1919) 193.

STEWART ISLAND: Bogs and subalpine meadows, abundant, *Thomson, Cockayne! Guthrie-Smith!* Sea-level to 2500 ft.

Clearly a distinct species, much more closely allied to *B. Rossii* than to *B. Hookeri*. I have seen but few specimens; and it is much to be regretted that Dr. Cockayne, when describing the plant, did not give a more adequate description.

(Col.) Benth & Hook f.

3. **B. Hookeri** *Benth. and Hook. f. Gen. Plant.* iii (1880) 784.—Very variable in size, usually from 1 to 2 ft. high, but sometimes attaining 3 ft., and occasionally dwarfed to 3 or 4 in. Leaves numerous, narrower in proportion than in *B. Rossii*, ⅙–¾ in. broad, narrow-linear, gradually tapering upwards, channelled in front, glabrous, green or glaucous-green. Scape much more slender than in *B. Rossii*; racemes not so dense-flowered, varying in length from 1 to 10 in. Flowers ⅓ in. diam., bright-yellow, hermaphrodite; pedicels slender, longer or shorter than the lanceolate bracts. Perianth-segments linear-oblong, obtuse, spreading. Stamens ¾ the length of the segments; filaments very slender, glabrous. Capsule oblong, ¼ in. long.—*Cheesem. Man. N.Z. Fl.* (1906) 718; *Ill. N.Z. Fl.* ii (1914) t. 202. Chrysobactron Hookeri *Col. in Hook. Ic. Plant.* (1852) t. 817; *Bot. Mag.* (1851) t. 4602; *Hook. f. Fl. Nov. Zel.* i (1853) 255. Anthericum Hookeri *Col. in Hook. f. Handb. Fl. N.Z.* (1864) 286. Trans. 44 33.

Var. **angustifolia** *Cockayne and Laing in Trans. N.Z. Inst.* xliii (1911) 366.—Smaller in all its parts than the type. Leaves narrower, ⅛–½ in. broad at the base, deeply concave, not glaucous. Racemes shorter and denser.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Mountain districts from Lake Taupo and Mount Egmont southwards, abundant. Sea-level to 4500 ft. October–January. Var. *angustifolia*: Dry mountain districts to the east of the Southern Alps, apparently plentiful.

One of the most widely distributed subalpine plants in the Dominion, everywhere present in damp peaty soil at elevations above 2000 ft. Of late years it has increased enormously in almost the whole of the open subalpine country along the chain of the Southern Alps, mainly through its power of resisting fire and from the fact that as a rule it is distasteful to stock.

Brown. 1810 276.

8. **ARTHROPODIUM** R. Br.

Tufted perennial herbs, with fleshy fibrous roots. Leaves radical or crowded near the base of the stem, linear or lanceolate, sheathing at the base. Scape or peduncle simple or branched above. Flowers in simple or branched racemes or panicles, white or purplish; pedicels slender, jointed at the middle, solitary or few together in the axil of a scarious bract. Perianth persistent but not twisted, 6-partite; segments distinct, spreading, 3-nerved, subequal or the inner rather broader. Stamens 6,

hypogynous or attached to the very base of the segments, shorter than the perianth; filaments bearded; anthers linear, erect, basifixed, introrsely dehiscent. Ovary sessile, 3-celled; ovules several in each cell; style filiform; stigma small. Capsule subglobose, loculicidally 3-valved. Seeds usually few in each cell, angular; testa black, smooth or minutely granulate.

Besides the 2 species found in New Zealand, both of which are endemic, there are 5 or 6 in Australia, and 1 in New Caledonia.

Tall and stout, 1–2½ ft. Leaves fleshy, 1–2 in. broad. Flowers ¾–1 in. diam.	1. *A. cirrhatum.*
Slender, 3–12 in. high. Leaves grassy, flaccid, $\frac{1}{10}$–¼ in. broad. Flowers ¼ in. diam.	2. *A. candidum.*

1. **A. cirrhatum** *R. Br. in Bot. Mag.* (1822) t. 2350.—A perfectly glabrous tufted herb 1–3 ft. high; root with copious long fleshy fibres. Leaves numerous, spreading, 1–2 ft. long, 1–2½ in. broad, lanceolate or oblanceolate, acute or acuminate, narrowed to an equitant and subdistichous base, flat or obtusely keeled, rather fleshy. Scape stout, terete, naked; panicle large, often 1 ft. long, deltoid, much branched; primary bracts broad, foliaceous. Flowers white, ¾–1 in. diam., 1–3 together along the branches of the panicle; pedicels $\frac{1}{3}$–⅔ in. long. Perianth-segments oblong-lanceolate, acuminate. Filaments filiform at the base, provided above the middle with a thickened densely woolly appendage, which is produced downwards into 2 woolly tails. Capsule oblong-globose, ⅓ in. long. Seeds black, opaque, angular.—*A. Cunn. Precur.* (1836) n. 299; *Raoul Choix* (1846) 40; *Hook. f. Fl. Nov. Zel.* i (1853) 254; *Handb. N.Z. Fl.* (1864) 285; *Cheesem. Man. N.Z. Fl.* (1906) 719. Anthericum cirratum *Forst. f. Prodr.* (1786) n. 148; *A. Rich. Fl. Nouv. Zel.* (1832) 155.

North Island: From the Three Kings Islands and the North Cape to Wellington, not uncommon, especially near the sea. South Island: Nelson—Takaka, *Kingsley;* West Wanganui, *Hursthouse.* Marlborough—Pelorus Sound, *Cockayne.* *Rengarenga.* November–December.

This differs from the other species of the genus in the woolly thickening at the middle of the filament being 2-lobed at the base, the lobes being revolute at the tip, somewhat after the fashion of a tendrill, from whence the specific name.

2. **A. candidum** *Raoul Choix* (1846) 14, t. 6.—A small slender glabrous herb 3–14 in. high; stem often swollen below the leaves and almost bulbous; roots long, fleshy. Leaves variable in length, 2–10 in. long, $\frac{1}{10}$–¼ in. broad, very narrow-linear, flat, grassy, membranous and flaccid. Scape very slender; raceme simple, rarely branched, usually overtopping the leaves. Flowers few or many, usually secund, solitary or the lower ones in twos or threes, white, ¼ in. diam.; pedicels slender, spreading or drooping; bracts long, linear-lanceolate, acuminate. Filaments naked at the base, then densely hairy almost up to the anther. Capsule globose, membranous, ⅙ in. diam. Seeds 2–3 in each cell, black, angled.—*Hook. f. Fl. Nov. Zel.* i (1853) 254; *Handb. N.Z. Fl.* (1864) 285; *Cheesem. Man. N.Z. Fl.* (1906) 719. A. reflexum *Col. in Trans. N.Z. Inst.* xviii (1886) 275. A. ramulosum *Col. l.c.* xxv (1893) 337.

North and South Islands: From Cape Colville southwards to Foveaux Strait, not uncommon. Sea-level to 3500 ft. November–January.

I cannot see upon what grounds Mr. Colenso has distinguished his two species. The type specimens in his herbarium exactly match ordinary states of *A. candidum.*

9. **HERPOLIRION** Hook. f.

A dwarf perennial herb. Rhizome slender, creeping, branched. Leaves crowded on short shoots from the rhizome, all radical, linear, distichous, sheathing at the base. Flower solitary, terminal, almost sessile amongst the leaves. Perianth funnel-shaped, persistent, 6-partite; segments distinct, linear, subequal, 5-nerved. Stamens 6, attached to the base of the segments and shorter than them; filaments filiform; anthers linear, erect, twisted after flowering, cells introrse, longitudinally dehiscent. Ovary subglobose, sessile, 3-celled; ovules several in each cell; style filiform; stigma terminal, punctiform. Capsule globose, enclosed in the persistent perianth, 3-celled, loculicidally 3-valved. Seeds oblong, subcompressed, quite smooth; testa black, crustaceous.

A monotypic genus confined to the mountains of New Zealand, Tasmania, and south-eastern Australia.

1. **H. novae-zealandiae** *Hook. f. Fl. Nov. Zel.* i (1853) 258.—Small, often forming broad patches in subalpine swamps. Leaves crowded, flat or involute, linear, striate, glaucous; the outer spreading or recurved, 1–2½ in. long; the inner much shorter, reduced to erect lanceolate sheathing bracts. Flower almost sessile, large for the size of the plant, ½–¾ in. long, lilac-blue or white. Perianth-segments erect below, spreading from a little below the middle. Stamens about ½ as long as the segments; filaments flattened, pubescent; anthers shortly sagittate at the base. Capsule globose-trigonous, ¼–⅓ in. diam.—*Handb. N.Z. Fl.* (1864) 287; *Cheesem. Man. N.Z. Fl.* (1906) 720. H. Tasmaniae *Hook. f. Fl. Tasm.* ii (1860) 54, t. 132B.

North Island: Kaikuri, Waitomo Caves, *E. Phillips Turner!* plains near Taupo, *Colenso! Tryon!* near Tongariro, *H. Hill! T. F. C.;* Whakaki, Hawke's Bay, *Bishop Williams!* Ruahine and Kaimanawa Mountains, *B. C. Aston!* South Island, Stewart Island: Not uncommon in subalpine swamps throughout. Usually from 2000 to 4000 ft., but descends to sea-level in Otago and Stewart Island. December–January.

10. **IPHIGENIA** Kunth.

Small glabrous herbs. Bulb tunicated. Stem simple, erect. Leaves few, scattered, linear, sheathing the stem. Flowers small, erect, solitary or corymbose. Perianth 6-partite, deciduous; segments free, all similar, linear or linear-oblong, spreading, flat. Stamens 6, hypogynous, shorter than the perianth; filaments flat; anthers oblong, versatile. Ovary superior, sessile, 3-celled; ovules numerous in each cell; styles 3, shortly connate at the base, linear, recurved, stigmatic along the inner edge. Capsule ovoid or oblong, 3–6-sulcate, 3-celled, loculicidally dehiscent. Seeds small, globose; testa thin, brown, appressed.

Besides the New Zealand species, which is endemic, there are 2 from India, 1 of which is also found in Australia, and 1 each from tropical Africa and Madagascar.

1. **I. novae-zealandiae** *Bak. in Journ. Linn. Soc.* xvii (1879) 451.—Bulb (corm) subglobose, ⅓ in. diam.; sheaths reddish, membranous. Stem 1–2 in. high. Leaves 2 or rarely 3, ½–3 in. long, narrow-linear, sheathing the greater part of the stem and exceeding it. Flower solitary, ¼ in. diam. Perianth-segments 4–6, oblanceolate, acute, with 6–8 longitudinal veins. Stamens 4–6, slightly shorter than the segments; anthers white, subglobose. Ovary broadly oblong, 2–3-celled; styles 2, rarely 3, subulate.

Capsule broadly oblong, usually 2-celled, $\frac{1}{6}$–$\frac{1}{5}$ in. diam.—*Cheesem. Man. N.Z. Fl.* (1906) 721. Anguillaria novae-zelandiae *Hook. f. ex T. Kirk in Trans. N.Z. Inst.* x (1878) App. xi.

South Island: Canterbury—*Lyall;* swamps near Christchurch, *J. B. Armstrong!* near Burnham, *T. Kirk!* Banks Peninsula, *Cockayne!* Lake Grassmere, *J. D. Enys!* Cass River, *Cockayne* and *Fowerake r!* Rangitata Valley, *Haast!* Otago—Otepopo, *Petrie!* Sea-level to 2500 ft. November–December.

Family XX. AMARYLLIDACEAE.

Usually perennial herbs, sometimes of large size. Rootstock bulbous, tuberous, tufted or creeping. Leaves generally all radical, narrow, not usually equitant or distichous. Flowers regular or slightly irregular, hermaphrodite, in terminal umbels or racemes or panicles, rarely solitary; peduncles or scapes naked or bracteate. Perianth superior, petaloid, tube long or short, limb 6-lobed or -partite, sometimes bearing at the throat a petaloid corona (*Narcissus*, &c.). Stamens 6, inserted on the perianth-tube or at the base of the segments and opposite to them; filaments free or united at the base; anthers 2-celled, versatile, introrse. Ovary inferior, 3-celled; style filiform or columnar, stigma simple or 3-fid; ovules numerous, in 2 series in the inner angle of each cell, anatropous. Fruit usually a 3-celled capsule with loculicidal dehiscence, rarely an indehiscent berry. Seeds generally numerous, sometimes reduced to 1 or 2 in each cell; albumen fleshy; embryo small, axile.

A well-known and widely distributed family, found in all warm and temperate countries, but (like the preceding family) decidedly rare in Asia. Genera 65; species under 700. It includes the American aloe (*Agave americana*), which can be applied to a wonderful variety of uses. Both it and other species of *Agave* are valuable fibre-plants, *A. rigida* being the well-known sisal hemp. The ornamental species are very numerous, the principal genera being *Narcissus, Galanthos* (snowdrop), *Leucoium* (snowflake), *Hippeastrum, Amaryllis, Vallota, Crinum, Alstraemeria, Agave, Fourcroya.* The single genus found in New Zealand is widely diffused.

1. HYPOXIS Linn.

Small herbs. Rhizome bulbous or tuberous, coated with a membranous or fibrous sheath. Leaves radical, narrow, flat or terete, often hairy. Scape 1- or many-flowered. Perianth regular, tube wanting; segments 6, nearly equal, spreading. Stamens 6, inserted on the base of the segments and shorter than them; anthers erect, linear or oblong, dorsifixed. Ovary inferior, 3-celled; ovules numerous in each cell, 2-seriate; style short, columnar; stigmas 3, stout, erect, distinct or connate. Capsule globose or oblong, membranous, 3-valved or circumscissile below the top. Seeds small, subglobose; testa crustaceous, shining, usually more or less beaked at the hilum.

Species over 50, mainly confined to southern or tropical Africa, a few only in Asia, Australasia, or America.

1. **H. pusilla** *Hook. f. Fl. Tasm.* ii (1860) 36, t. 130B.—Very small, 1–2 in. high. Rhizome globose, bulb-like, clothed with the setose remains of the old leaves, $\frac{1}{3}$ in. diam. Leaves 3–6, $\frac{1}{2}$–2 in. long, filiform, wiry,

flexuous, grooved down the inner face, base widened into a scarious sheath. Scapes shorter than the leaves, 1-3-flowered. Flowers small, $\frac{1}{6}$ in. diam. Perianth-segments ovate-lanceolate, acute. Stamens short, not $\frac{1}{2}$ as long as the perianth-segments; anthers linear, basified. Stigmas lanceolate, free. Capsule globose, $\frac{1}{8}$ in. diam.—*Handb. N.Z. Fl.* (1864) 275; *Benth. Fl. Austral.* vi (1873) 449; *Cheesem. Man. N.Z. Fl.* (1906) 701. H. hygrometrica *Hook. f. Fl. Nov. Zel.* i (1853) 253 (*not of R. Br.*).

North Island: Hawke's Bay—*Colenso.* South Island: Marlborough—Sandy ground near the mouth of the Wairau River, *J. H. Macmahon!* Canterbury—Banks Peninsula, *H. H. Travers, J. B. Armstrong! Cockayne!* Canterbury Plains, *J. B. Armstrong!* November–April.

Probably not uncommon on the eastern side of the South Island, but very easily overlooked. Also a native of Victoria and Tasmania.

Family XXI. **IRIDACEAE.**

Perennial herbs, with a tuberous or bulbous or creeping rhizome. Leaves usually all radical, narrow, equitant and distichous. Flowers hermaphrodite, regular or obliquely irregular, solitary and terminal, or in spikes or corymbs or panicles, or clustered, enclosed within 2 spathaceous usually scarious bracts. Perianth superior, petaloid, marcescent; segments 6, in 2 series, imbricate. Stamens 3, epigynous or inserted on the outer perianth-segments; filaments free or united into a tube; anthers 2-celled, opening outwards. Ovary inferior, 3-celled; style filiform, usually 3-fid above; divisions stigmatic at the end, subulate or narrow or broad, sometimes petaloid; ovules numerous, in the inner angle of each cell, anatropous. Fruit a coriaceous 3-celled usually trigonous capsule, loculicidally 3-valved. Seeds usually numerous, albuminous; embryo short, cylindric.

A large family, comprising nearly 60 genera and about 800 species, dispersed over the whole world, but most abundant and varied in South Africa, plentiful in south Europe, not infrequent in America, comparatively rare in Asia. The family includes few useful species. Some are said to be purgative and diuretic, and the dried stigmas of the saffron (*Crocus sativus*) are a well-known dye. Many of the species are cultivated in gardens on account of the beauty of their flowers, especially of the genera *Iris, Crocus, Ixia,* and *Gladiolus.* The single New Zealand genus extends to Australia on the one side and South America on the other.

LIBERTIA Spreng. 1825. Syst. 1: 127; 145.

Perennial herbs with a short creeping rhizome and long fibrous roots. Leaves numerous, densely crowded at the base of the stem, distichously imbricate, equitant, linear or ensiform, flat, rigid. Flowering-stems erect, simple or branched; cauline leaves few. Flowers on slender pedicels, clustered in the axils of sheathing bracts, forming a corymbose-paniculate or subumbellate inflorescence. Perianth regular, tube wanting; segments 6, spreading, free to the base, the 3 inner rather longer and broader. Stamens 3; filaments free or slightly connate at the base; anthers linear-sagittate, versatile. Ovary 3-celled; ovules many in each cell; style short, with 3 linear-subulate spreading branches. Capsule broadly oblong or obovoid or globose, 3-valved. Seeds angled or compressed, smooth or foveolate.

A small genus of 8 or 10 species, found in New Zealand, Australia, and extra-tropical South America. One of the New Zealand species extends to Australia and Tasmania, the remaining two are endemic.

Leaves $\frac{1}{6}$–$\frac{1}{3}$ in. broad. Flower-clusters many, panicled. Capsule $\frac{1}{3}$–$\frac{1}{2}$ in. long	1. *L. ixioides.*
Leaves $\frac{1}{3}$–$\frac{1}{2}$ in. Flower-clusters many, panicled. Capsule $\frac{1}{2}$–$\frac{3}{4}$ in. long	2. *L. grandiflora.*
Leaves $\frac{1}{12}$–$\frac{1}{6}$ in. Flower-clusters solitary or rarely 2–3. Capsule globose, $\frac{1}{5}$ in. diam.	3. *L. pulchella.*

1. **L. ixioides** *Spreng. Syst.* i (1825) 168.—Rhizome very short. Leaves numerous, densely tufted, 1–2 ft. long, $\frac{1}{6}$–$\frac{1}{3}$ in. broad, narrow-linear, acuminate, rigid and coriaceous, striate; margins cartilaginous, smooth or very obscurely and minutely scabrid. Flowering stem longer or shorter than the leaves, usually with 1 or 2 cauline leaves below the inflorescence. Panicle broad; branches alternate from the axils of membranous sheathing bracts, bearing subumbellate clusters of 2–10 rather large white flowers on long pedicels. Perianth variable in size, $\frac{1}{2}$–1 in. diam.; the 3 outer segments oblong or elliptic, often greenish on the outside; the 3 inner larger and broader, broadly oblong or orbicular, pure-white. Capsule broadly oblong or obovoid, $\frac{1}{3}$–$\frac{1}{2}$ in. long.—*A. Cunn. Precur.* (1836) n. 307; *Raoul Choix* (1846) 41; *Hook. f. Fl. Nov. Zel.* i (1853) 252; *Handb. N.Z. Fl.* (1864) 274; *Cheesem. Man. N.Z. Fl.* (1906) 699. L. restioides *Klatt in Linnaea,* xxxi (1861–62) 383. L. orbicularis *Col. in Trans. N.Z. Inst.* xv (1883) 329. Sisyrinchium ixioides *Forst. f. Prodr.* (1786) n. 325; *A. Rich. Fl. Nouv. Zel.* (1832) 161. Ferraria ixioides *Willd. Sp. Plant.* iii (1800) 582. Renealmia ixioides *Ker-Gawl Gen. Irid.* (1827) 27. Nematostigma ixioides *A. Dietr. Sp. Plant.* ii (1833) 27.

Var. *a.*—Bracts all lanceolate.

Var. *b.*—Upper bracts ovate, acute.

North and South Islands, Stewart Island, Chatham Islands: Abundant from the North Cape southwards. Sea-level to 2000 ft. *Tukauki.* October–December.

A very variable plant. Var. *b* appears to be rare in the North Island.

2. **L. grandiflora** *Sweet Hort. Brit.* ed. ii (1830) 498.—Habit of *L. ixioides,* but taller and stouter, 2–3 ft. high, with leaves $\frac{1}{3}$–$\frac{1}{2}$ in. broad. Flowering stem and bracts much as in *L. ixioides.* Flowers rather larger, the inner perianth-segments much larger and broader than the outer, often 3 or 4 times as large. Capsule much larger, $\frac{1}{2}$–$\frac{3}{4}$ in. long, broadly oblong or obovoid, yellow when fully ripe.—*Hook. f. Handb. N.Z. Fl.* (1864) 274; *Cheesem. Man. N.Z. Fl.* (1906) 699. L. macrocarpa *Klatt in Linnaea,* xxxi (1861–62) 384. Renealmia grandiflora *R. Br. Prodr.* (1810) Add. 592.

North and South Islands: From the North Cape to Otago, but not so common as *L. ixioides.* October–November.

But for the great difference in the size of the capsule this might very well have been regarded as a variety of *L. ixioides.*

3. **L. pulchella** *Spreng. Syst.* i (1825) 168.—Small, slender, 3–9 in. high. Rhizome often elongated, sometimes branched at the top. Leaves 2–6 in. long, $\frac{1}{12}$–$\frac{1}{6}$ in. broad, grassy, hardly rigid, margins smooth or ciliolate. Scape usually longer than the leaves, bearing a single terminal subumbellate cluster of 3–8 small white flowers, or in large specimens 1 or 2 other clusters

new species.

Libertia peregrinans, Ckn. & Allan.

North and South Is, and Chatham Is., forming extensive colonies in sand hollows.

"distinguished from L. ixioides by the far spreading rhizomes, emitting dense tufts of leaves at intervals."

see T.N.Z.I. vol. 57, p. 56. Ckn. & Allan.

Family XXII. BURMANNIACEAE.

Annual or perennial herbs, usually of small size and saprophytic; stems whitish or pink, rarely green; leaves usually absent. Flowers hermaphrodite, solitary and terminal or arranged in a 2-fid helicoid cyme. Perianth superior, regular, petaloid; segments 6 or 3, free. Stamens generally 6, affixed to the base of the perianth-tube; filaments short; anthers 2-celled, their connectives usually dilated, and sometimes connate into a tube. Ovary inferior, 1-celled with 3 parietal placentas, or 3-celled with as many axile placentas. Ovules numerous on each placenta, minute; style short, simple; stigmas 3. Fruit a capsule with variable dehiscence; seeds numerous, small.

A small family of about 16 genera and 75 species, almost confined to the tropics; but a few species extend into the North Temperate Zone, one reaching as far north as Illinois, in the United States. In the Southern Hemisphere a single species occurs in Tasmania and another in New Zealand. The species have no important properties or uses.

1. BAGNISIA Becc.

Small fleshy saprophytes, everywhere smooth and glabrous, leaves absent or reduced to scales. Rhizome creeping, sparingly or copiously branched, putting up here and there short erect peduncles or stems, furnished with small scale-like leaves or bracts. Flowers solitary, terminal, variously coloured. Perianth-lobes 6, the 3 inner larger, dilated at the tip, and connivent into a kind of hood; the 3 inner somewhat smaller, free. Stamens 6, affixed to the throat of the perianth-tube, abruptly deflexed; connectives very large, connivent into a tube; anthers 2-celled. Style short; apex 3-fid, stigmatose. Fruit turbinate; seeds numerous, small.

A curious little genus of 7 or 8 species; all Malayan except one found in New Zealand, another in Tasmania, and a third in the northern United States of America.

1. **B. (Geomitra) Hillii** *Cheesem. in Kew Bulletin* (1908) 420.—A minute colourless saprophyte, perfectly smooth in all its parts, leaves wanting or reduced to minute scales. Rhizomes creeping amongst humus at the base of tall forest-trees, sparingly or copiously branched, 2–4 in. long, $\frac{1}{40}$–$\frac{1}{30}$ in. diam., fleshy, naked. Peduncles springing from the axils of minute fleshy bracts, 1-flowered, erect or curved, $\frac{1}{5}$–$\frac{1}{2}$ in. long; bracteoles 3–7, alternate, lanceolate or ovate-lanceolate, acute or acuminate, the upper gradually larger, $\frac{1}{40}$–$\frac{1}{8}$ in. long. Flowers solitary, terminal, large

the leaves, usually with 1 or 2 cauline leaves below the inflorescence. Panicle broad; branches alternate from the axils of membranous sheathing bracts, bearing subumbellate clusters of 2–10 rather large white flowers on long pedicels. Perianth variable in size, ½–1 in. diam.; the 3 outer segments oblong or elliptic, often greenish on the outside; the 3 inner larger and broader, broadly oblong or orbicular, pure-white. Capsule broadly oblong or obovoid, ⅓–½ in. long.—*A. Cunn. Precur.* (1836) n. 307; *Raoul Choix* (1846) 41; *Hook. f. Fl. Nov. Zel.* i (1853) 252; *Handb. N.Z. Fl.* (1864) 274; *Cheesem. Man. N.Z. Fl.* (1906) 699. L. restioides *Klatt in Linnaea*, xxxi (1861–62) 383. L. orbicularis *Col. in Trans. N.Z. Inst.* xv (1883) 329. Sisyrinchium ixioides *Forst. f. Prodr.* (1786) n. 325; *A. Rich. Fl. Nouv. Zel.* (1832) 161. Ferraria ixioides *Willd. Sp. Plant.* iii (1800) 582. Renealmia ixioides *Ker-Gawl Gen. Irid.* (1827) 27. Nematostigma ixioides *A. Dietr. Sp. Plant.* ii (1833) 27.

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may be developed lower down the scape; pedicels very slender, pubescent, $\frac{3}{4}$–1 in. long; bracts numerous, whorled at the base of the clusters. Perianth $\frac{1}{3}$–$\frac{1}{2}$ in. diam.; segments almost equal, oblong-obovate. Capsule $\frac{1}{6}$–$\frac{1}{5}$ in. diam., globose, membranous.—*Benth. Fl. Austral.* vi (1873) 413; *Cheesem. Man. N.Z. Fl.* (1906) 700. L. micrantha *A. Cunn. Precur.* (1836) n. 308; *Raoul Choix* (1846) 41; *Hook. f. Fl. Nov. Zel.* i (1853) 252; *Handb. N.Z. Fl.* (1864) 274.

North and South Islands, Stewart Island: Damp mossy places in hilly forests throughout, not uncommon. Sea-level to 4000 ft. November–January. Also in south-eastern Australia and Tasmania.

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for the size of the plant, ¼–½ in. long, about ⅕ in. broad, bright rose-pink when fresh. Perianth campanulate-lanterniform; tube obovate-oblong, distinctly 6–12-costate; outer perianth-segments smaller, free, linear or oblong, at first erect but ultimately spreading, sometimes abruptly recurved. Inner segments almost twice the length of the outer, linear-spathulate to obovate-oblong, connate or connivent at the tip, gaping at the middle, keeled on the back, with the keel produced upwards into a subulate point. Stamens 6, affixed to the throat of the perianth-tube, shortly exserted, abruptly deflexed within the tube; filaments very short, free; anther-connectives much enlarged and expanded, connate into a membranous tube which is bilamellate at the apex; anther-cells small, distinct, placed towards the base of the tube formed by the connectives. Ovary inferior, broadly obovoid, 1-celled; placentas 3, free; ovules very numerous; style short, thick; stigma 3-lobed, the lobes broad, almost quadrate, concave, truncate at the tip. Fruit unknown.—*Cheesem. Illus. N.Z. Fl.* ii (1914) t. 191A. Thismia Hillii *Pfeiffer in Bot. Gazette*, lvii (1914) 122.

North Island: Forests at Opepe, near Lake Taupo, on mounds of humus at the base of *Podocarpus dacrydioides* and other trees, alt. 2000 ft., *H. Hill! A. Hamilton! T. F. C.* January. WLH? Cunn, ad Tangarino.

A very remarkable little plant. It is closely allied to the Tasmanian *B. Rodwayi*, but a comparison between Mr. Rodway's plate given in his "Tasmanian Flora" and Miss Smith's careful drawing of *B. Hillii* in my "Illustrations of the New Zealand Flora" (t. 191) will show structural differences of considerable importance.

Miss Pfeiffer, in a valuable paper printed in the *Botanical Gazette* (vol. xlvii, p. 122), suggests that *Bagnisia*, with several allied genera, should be merged with *Thismia*. This step appears to me to be retrograde, and not at all in keeping with the work done of late years in the family by Warming, Urban, and Engler.

Roxb. Proc. Linn. Soc. N.S.W. 53: 1928. 556.

Family XXIII. **ORCHIDACEAE.**

Herbs, either terrestrial and tuberous-rooted, with annual herbaceous stems, or epiphytes with creeping rhizomes emitting fibrous or fleshy roots and bearing simple or branched leafy stems often thickened into pseudobulbs. Flowers hermaphrodite, solitary or in spikes or racemes or panicles, often large and showy. Perianth superior, irregular, of 6 free or more or less combined segments, in 2 series; the 3 outer (sepals) all similar or the dorsal one larger and more concave than the 2 lateral which are always alike; the 3 inner (petals) always dissimilar (except in *Thelymitra*), the 2 lateral alike, but the third (called the lip, or *labellum*) usually exceedingly different, often spurred, lobed, fringed, or furnished with glands or other appendages. Stamens and style confluent into a fleshy variously shaped central body facing the lip, called the column; anther usually solitary (2 in *Cypripedium*), placed on the front, top, or back of the column, and either free or adnate to it, persistent or deciduous, usually 2-celled; pollen granular or waxy, usually cohering in each cell into 1, 2, or 4 pairs of pollen-masses (*pollinia*), which are either free or attached, directly or by a caudicle, to a gland on the apex of the stigma (*rostellum*). Ovary inferior, 1-celled; ovules numerous, on 3 parietal placentas; stigma a viscid depression towards the top or on the front of the column, below the anther, facing the lip, upper margin often produced into a beak or point called the rostellum. Fruit a 1-celled 3-valved capsule; seeds numerous, very minute; testa loose, reticulate; albumen wanting; embryo solid, fleshy.

A very extensive and distinct family, found in almost all parts of the world, but rare or absent in extreme northern or southern latitudes, and on the tops of high alpine mountains. Most of the species found in temperate countries are terrestrial; but in the tropics the greater number are epiphytes, growing upon the branches or trunks of trees

add. PETALOCHILUS

See T.N.Z.I. vol.56 (1926), p.16.

1. P. calyciformis

2. P. succatus.

Rogers. J. Bot. Mar. 1924.

** Pollinia attached to the rostellum by a caudicle.

Stems short, leaves few. Flowers small, in lateral racemes. Lip 3-lobed .. .. 4. SARCOCHILUS.

B. Terrestrial, with tuberous roots and annual stems. Pollinia granular or powdery.

* Leaves long, very narrow-linear, flat or terete.

a. Leaves more than one.

Flowers numerous, on a spirally twisted spike. Dorsal sepal and petals connivent into a hood. Lip undivided .. .. 5. SPIRANTHES.

Flowers several, spicate. Dorsal sepal broad, hooded; lateral linear or filiform, erect. Lip 3-lobed .. .. .. 7. ORTHOCERAS.

b. Leaf solitary.

Sepals, petals, and lip all similar in shape, petaloid. Column very short, not attached to the lip at the base .. .. .. 6. THELYMITRA.

Dorsal sepal concave. Petals much smaller. Surface of lip covered with long hairs. Column very short .. .. .. 14. CALOCHILUS.

Dorsal sepal concave. Lip uppermost, undivided, usually with an adnate gland on the disc. Column very short, with two lateral erect appendages .. .. 9. PRASOPHYLLUM.

Dorsal sepal concave. Lip below, entire or 2-lobed. Column very short .. .. 8. MICROTIS.

Sepals and petals all linear. Lip uppermost, articulate, clawed; lamina peltate, irritable and mobile. Column long, winged .. 10. CALEANA.

Sepals and petals narrow. Lip entire or 3-lobed, not jointed or irritable, disc with glandular processes, margin often fringed. Column long, winged above .. .. 16. CALADENIA.

** Leaves shorter, two or several, oblong or lanceolate or linear.

Leaves numerous; radical broad, sometimes wanting; cauline narrow. Flowers hood-shaped, green. Lateral sepals united at the base. Lip narrow, irritable, with a basal appendage .. 11. PTEROSTYLIS.

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The close affinity existing between the flora of New Zealand and that of Australia is nowhere better shown than in the *Orchideae*. Out of 21 genera found in New Zealand, 20 occur in Australia as well, and 8 are absolutely confined to the two countries, while several others have a very limited additional range. The only genera with a wide distribution are *Dendrobium*, *Bulbophyllum*, and *Spiranthes*. *Earina*, which does not occur in Australia, is found in the Pacific islands.

A. Epiphytes with creeping rhizomes, perennial stems, and evergreen leaves. Pollinia waxy, free or attached by caudicles to the rostellum.

* Pollinia free.

The New Zealand species with slender much-branched stems, no pseudobulbs, and axillary flowers. Lateral sepals and lip adnate to the base of the column .. .. 1. DENDROBIUM.

The New Zealand species forming small matted patches on the trunks of trees, furnished with pseudobulbs. Flowers on a scape rising from the base of the pseudobulb. Lip jointed on to the base of the column, mobile .. .. 2. BULBOPHYLLUM.

Stems leafy, unbranched. Flowers in terminal panicles. Lateral sepals free. Lip 3-lobed .. .. 3. EARINA.

** Pollinia attached to the rostellum by a caudicle.

Stems short, leaves few. Flowers small, in lateral racemes. Lip 3-lobed .. .. 4. SARCOCHILUS.

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Leaves numerous; radical broad, sometimes wanting; cauline narrow. Flowers hood-shaped, green. Lateral sepals united at the base. Lip narrow, irritable, with a basal appendage .. 11. PTEROSTYLIS.

Leaves 2–3, lanceolate. Upper sepal broad, concave; lateral narrow. Lip broad, papillose or ridged. Column not winged .. 15. LYPERANTHUS.
Leaves 2, radical, oblong. Upper sepal broad, concave; lateral narrow-linear. Lip broad, with raised glands on the disc. Column winged, wings produced into 2 erect lobes at the top .. 17. CHILOGLOTTIS.

*** Leaf solitary, broad.

Flower solitary, large, purple. Upper sepal broad, concave; lateral and petals long and filiform or minute. Lip large, broad, involute. Column very short .. .. 20. CORYSANTHES.
Flower solitary. Upper sepal narrow, concave; lateral and petals lanceolate. Lip 3-lobed; disc with raised glands. Column long, winged above; wing produced upwards into 2 toothed lobes .. 18. ADENOCHILUS.
Flowers 1 or 2. Upper sepal broad, concave; lateral lanceolate. Petals minute. Lip broad, undivided; disc smooth. Column long, equally winged, wings not produced upwards .. .. 19. TOWNSONIA.
Flowers several. Sepals and petals narrow, acuminate. Lip spreading, broad, concave. Column long .. .. .. 12. ACIANTHUS.
Flowers 2–3. Sepals and petals linear, obtuse. Lip spreading, narrow, flat. Column long, winged above .. .. .. 13. CYRTOSTYLIS.

**** Leafless. Stem tall, with brown sheathing scales.

Sepals and petals united into a 5-lobed ventricose tube .. .. 21. GASTRODIA.

The above clavis is purely artificial, and is solely intended to facilitate the determination of the genera. The following arrangement, which is adapted from Hooker and Bentham's "Genera Plantarum" and Engler's "Pflanzenfamilien," is more natural and shows the sequence adopted in this work:—

Tribe I. EPIDENDREAE.—Anther lid-like, usually deciduous; cells parallel, distinct. Pollinia waxy, 1–4 in each cell, free, or those of each cell connected by a viscid appendage, not attached by their bases or by a caudicle to the rostellum.

1. DENDROBIUM. 2. BULBOPHYLLUM. 3. EARINA.

Tribe II. VANDEAE.—Anther lid-like, usually deciduous, resting on the rostellum; cells usually confluent. Pollinia waxy, usually 2 or 4 in superposed pairs, attached singly or in pairs to a gland or process of the rostellum, which comes away with them when they are removed.

4. SARCOCHILUS.

Tribe III. NEOTTIEAE.—Anther lid-like or erect and persistent; cells distinct, parallel. Pollinia granular or powdery.

Subtribe 1. *Spirantheae.*

5. SPIRANTHES.

Subtribe 2. *Thelymitreae.*

6. THELYMITRA.

Subtribe 3. *Diurideae.*

7. ORTHOCERAS. 8. MICROTIS. 9. PRASOPHYLLUM.

Subtribe 4. *Pterostylideae.*

10. CALEANA. 11. PTEROSTYLIS.

Subtribe 5. *Caladeniae.*

12. ACIANTHUS. 13. CYRTOSTYLIS. 14. CALOCHILUS. 15. LYPERANTHUS. 16 CALADENIA. 17. CHILOGLOTTIS. 18. ADENOCHILUS. 19. TOWNSONIA.

Subtribe 6. *Pogonieae.*

20. CORYSANTHES.

Subtribe 7. *Gastrodieae.*

21. GASTRODIA.

1. **DENDROBIUM** Swartz.

Epiphytes. Stems long and branching, or short and simple and thick, sometimes reduced to pseudobulbs. Leaves coriaceous or fleshy, never plaited. Flowers often large and handsome, rarely small. Sepals nearly equal, the lateral ones dilated at the base, and obliquely adnate to the foot of the column, forming a short spur or pouch. Petals about as long as the upper sepal. Lip contracted at the base and adnate to the produced foot of the column, rarely clawed, usually 3-lobed; lateral lobes embracing the column or spreading; middle lobe broad or narrow, spreading or recurved; disc often lamellate. Column short, produced at the base, winged or angled or toothed at the top. Anther terminal, lid-like, 2-celled; pollinia 4, free, compressed, in collateral pairs in each cell.

A large genus of probably 600 species, most abundant in the Malay Archipelago, but extending as far north as Japan, and southwards through Australia and Polynesia to New Zealand. The single species found in New Zealand is endemic, but is closely allied to the Polynesian *D. biflorum* Swartz.

1. **D. Cunninghamii** *Lindl. Bot. Reg.* sub. t. 1756.—Stems usually much branched, slender, rigid, wiry, terete, polished, 1–4 ft. long; usually pendulous, but small specimens growing on rocks or in exposed places are often erect. Leaves numerous, distichous, alternate, $\frac{3}{4}$–2 in. long, $\frac{1}{6}$–$\frac{1}{5}$ in. broad, linear-lanceloate, acute, rigid and coriaceous, striate and more or less conspicuously 3-nerved; sheaths truncate, grooved and transversely corrugated. Peduncles shorter or longer than the leaves, usually 1–3-flowered, rarely 3–6-flowered; pedicels slender; bracts short. Flowers $\frac{3}{4}$ in. diam., white and pink. Upper sepal oblong-lanceolate, acute; lateral rather larger, broader at the base. Petals about equalling the sepals, oblong, obtuse. Lip attached by a short claw to the foot of the column, 3-lobed; lateral lobes small, ascending; middle lobe spreading, large, almost as broad as long; margins undulate; disc with 4 or 5 thin lamellae. Capsule oblong, $\frac{1}{3}$ in. long.—*A. Cunn. Precur.* (1836) n. 316; *Raoul Choix* (1846) 41; *Hook. f. Fl. Nov. Zel.* i (1853) 240; *Handb. N.Z. Fl.* (1864) 262; *Cheesem. Man. N.Z. Fl.* (1906) 663. D. biflorum *A. Rich. Fl. Nouv. Zel.* (1832) 167, t. 26 (*not of Swartz*). D. Lessonii *Col. in Trans. N.Z. Inst.* xv (1883) 326.

North and South Islands, Stewart Island: Lowland districts from the North Cape southwards, not uncommon in forests. Sea-level to 2000 ft. December–February.

For some notes on the fertilization, see a paper by Mr. G. M. Thomson in Trans. N.Z. Inst. xi (1879) 419. I cannot separate Mr. Colenso's *D. Lessonii* from the ordinary state of the plant, even as a variety.

2. **BULBOPHYLLUM** Thouars.

Epiphytes. Rhizome creeping, often matted, usually more or less clothed with scarious sheathing scales. Pseudobulbs sessile in the axils of the scales, each crowned with 1 or rarely 2 leaves. Flowers small or large, solitary, spiked or racemed on a peduncle arising from the base of the pseudobulbs. Sepals nearly equal, the lateral ones adnate to the foot of the column. Petals usually smaller than the sepals. Lip contracted at the base and jointed on to the produced foot of the column, usually small and recurved, generally mobile. Column short, erect, produced at the base, often 2-aristate at the top. Anther terminal, lid-like, 2-celled; pollinia 4 (rarely 2), free, in pairs in each cell.

A genus of over 275 species, with its chief centre of distribution in tropical Asia, but also found in tropical Africa, Australia, New Zealand, and sparingly in South America.

Leaves $\frac{1}{2}$–1 in. Peduncles 2–4-flowered. Lip orange-red .. 1. *B. tuberculatum.*

Leaves $\frac{1}{4}$–$\frac{1}{3}$ in. Flowers solitary. Lip white .. .. .. 2. *B. pygmaeum.*

1. **B. tuberculatum** *Col. in Trans. N.Z. Inst.* xvi (1884) 336, *and* xxii (1890) 488.—Forming densely matted patches on the trunks or branches of trees. Pseudobulbs $\frac{1}{4}$–$\frac{1}{3}$ in. long, broadly oblong or nearly orbicular, almost smooth and unwrinkled when fresh, deeply rugose when dry, more or less clothed with white bullate scales. Leaves solitary on the pseudobulbs, $\frac{1}{2}$–1 in. long, linear-oblong, acute at both ends, thick and fleshy, slightly concave above, midrib prominent beneath, striate, under-surface with minute whitish dots. Peduncles very slender, almost filiform, $\frac{1}{2}$–$\frac{3}{4}$ in. long, 2–4-flowered; pedicels short; bracts minute. Flowers $\frac{1}{6}$ in. long, white with a bright reddish-orange lip. Upper sepal oblong-lanceolate, subacute; lateral larger, triangular, broad at the base. Petals triangular, much smaller than the sepals. Lip almost as long as the sepals, hinged on to the produced base of the column; lamina oblong-ovate or subhastate, truncate at the base, concave, very thick and fleshy, lower part of disc with 2 minute raised ridges. Column very short, stout, 2-winged at the top. Capsule broadly oblong, $\frac{1}{6}$ in. long.—*Cheesem. Man. N.Z. Fl.* (1906) 664; *Ill. N.Z. Fl.* ii (1914) t. 191. B. exiguum *Buch. in Trans. N.Z. Inst.* xvi (1884) 397 (*not of F. Muell.*).

North Island: Auckland—Kaitaia, *R. H. Matthews!* Lower Waikato, *H. Carse!* East Cape district, *T. Kirk.* Hawke's Bay—Petane, *A. Hamilton!* Wellington—Palmerston North, *A. Hamilton!* South Island: Nelson—Collingwood, *Dall!* April–May.

A charming little plant. It was referred by Mr. Buchanan to the Australian *B. exiguum*, and no doubt is closely allied to it, principally differing in the smaller size and more compact habit, shorter peduncles, shorter and broader sepals and petals, and broader and thicker bright orange-red lip.

2. **B. pygmaeum** *Lindl. Gen. et Sp. Orch.* (1830) 58.—Minute, forming densely matted carpets on the trunks of trees or on rocks. Pseudobulbs $\frac{1}{8}$–$\frac{1}{6}$ in. diam., globose or globose-depressed, glabrous, much wrinkled when dry. Leaves solitary on the pseudobulbs, springing from a minute circular sheath, $\frac{1}{4}$–$\frac{1}{3}$ in. long, linear-oblong, obtuse, very thick and coriaceous, grooved down the middle and minutely echinulate above, naked and longitudinally nerved beneath. Peduncles solitary from the base of the pseudobulbs, very short, $\frac{1}{3}$–$\frac{1}{6}$ in. long, 1-flowered; bract minute. Flowers very minute, whitish. Upper sepal narrow-ovate; lateral rather larger, broadly triangular. Petals shorter than the sepals, oblong, subacute. Lip clawed on to the projecting foot of the column; claw long; lamina ovate, obtuse, thickened, disc with indistinct ridges. Ovary broadly oblong, gibbous, minutely echinulate.—*A. Cunn. Precur.* (1836) n. 317; *Raoul Choix* (1846) 41; *Hook. f. Fl. Nov. Zel.* i (1853) 240; *Handb. N.Z. Fl.* (1864) 263; *Cheesem. Man. N.Z. Fl.* (1906) 664. B. ichthyostomum *Col. in Trans. N.Z. Inst.* xxvi (1894) 319. Dendrobium pygmaeum *Smith in Rees Cyclop.* xi (1802) n. 27.

North and South Islands: On the trunks of trees or rocks, from the North Cape to Otago; in the South Island chiefly on the western side. Sea-level to 1500 ft. November–February.

I do not see upon what grounds Mr. Colenso has separated his *B. ichthyostomum.* The type specimens in his herbarium appear to me to be typical *B. pygmaeum.*

3. **EARINA** Lindl.

Epiphytes. Stems tufted, simple, compressed; pseudobulbs wanting. Leaves distichous, alternate, narrow-linear. Flowers rather small, in terminal simple or branched bracteate racemiform panicles. Sepals about equal, spreading, free. Petals similar to the sepals. Lip affixed to the base of the column or its slightly produced foot, 3-lobed; lateral lobes small or large; middle lobe broad, entire or emarginate or 2-lobed. Column short, stout, sometimes produced at the base. Anther terminal, lid-like, 2-celled; pollinia 4, waxy, aggregated in pairs in each cell, free or cohering at the base by a short viscid appendage. Capsule oblong.

Besides the three species found in New Zealand, which are endemic, there are five or six species in the Pacific islands, ranging from New Caledonia to Tahiti.

Slender. Leaves $\frac{1}{6}$–$\frac{1}{5}$ in. broad. Flowers remote, $\frac{1}{4}$ in. diam. Lip deeply 3-lobed, disc eglandular .. .. 1. *E. mucronata.*
More rigid. Leaves $\frac{1}{5}$–$\frac{1}{3}$ in. broad. Flowers remote, $\frac{1}{3}$ in. diam. Lip deeply 3-lobed, lobes more acute, disc eglandular .. .. 2. *E. aestivalis.*
Stout, rigid. Panicle stiff, flowers close. Lip very obscurely 3-lobed, disc with 2 ridges .. .. 3. *E. autumnalis.*

1. **E. mucronata** *Lindl. in Bot. Reg.* (1835) sub. t. 1699.—Rhizome creeping. Stems numerous, 1–3 ft. long, slender, simple, pendulous or rarely erect, smooth, compressed and 2-edged, spotted. Leaves 3–6 in. long, $\frac{1}{6}$–$\frac{1}{5}$ in. broad, narrow-linear, acuminate, flat, smooth, thin but coriaceous, very finely striate. Panicle terminal, slender, sparingly branched, 2–5 in. long, many-flowered; bracts clasping, striate. Flowers rather distant, sessile, $\frac{1}{4}$ in. diam. Sepals and petals linear-oblong, spreading, obtuse, pale-yellow. Lip darker yellow with a brownish-orange spot at the base, deeply 3-lobed; middle lobe broader than long, again divaricately 2-lobed; disc eglandular. Column short, stout. Pollinia attached at the base to a short caudicle. Capsule oblong, $\frac{1}{4}$ in. long.—*A. Cunn. Precur.* (1836) n. 315; *Raoul Choix* (1846) 41; *Hook. Ic. Plant.* (1842) t. 431; *Hook. f. Fl. Nov. Zel.* i (1853) 239; *Handb. N.Z. Fl.* (1864) 262; *Cheesem. Man. N.Z. Fl.* (1906) 665. E. quadrilobata *Col. in Trans. N.Z. Inst.* xv (1883) 325.

North and South Islands, Stewart Island, Chatham Islands: Not uncommon in lowland forests throughout, epiphytic on the trunks and limbs of trees, more rarely on rocks. Sea-level to 2000 ft. October–December.

2. **E. aestivalis** *Cheesem. in Trans. N.Z. Inst.* li (1919) 93.—Rhizome creeping, much as in *E. mucronata.* Stems numerous, 9–18 in. long, suberect or drooping, smooth, compressed, rather broader and stouter than in *E. mucronata,* and firmer. Leaves 3–6 in. long, $\frac{1}{5}$–$\frac{1}{3}$ in. broad, flat, stiff, erect, narrow-linear, acute or acuminate; midrib and veins conspicuous on the under-surface, not so evident above. Panicle terminal, 2–5 in. long; branches or racemes 3–7, rarely more, 1–1$\frac{1}{2}$ in. long, 4–7-flowered; bracts short and broad, clasping, many-striate. Flowers larger than in *E. mucronata,* $\frac{1}{3}$ in. diam. or more. Sepals and petals similar in size and shape, linear-oblong, subacute. Lip longer than in *E. mucronata,* and brighter in colour; lateral lobes wider and more acute. Column short, stouter.

North Island: Mongonui County, in forest near Ahipara, *H. B. Matthews!* and at Kaiaka, *H. Carse!* In forest near Muriwai, and near the mouth of the Waitakere River, *T. F. C.* Forest by the Waikanae River, Wellington, *B. H. Morison!* Sea-level to 1500 ft. January–February.

Although only recently described, I have been acquainted with this for many years, having gathered specimens at Muriwai as far back as 1895. It is doubtless a close relative of *E. mucronata*, but is separated without much difficulty by the stiffer and more robust habit, shorter firmer and broader leaves, larger flowers, and longer labellum, the lateral lobes of which are longer and more acute.

3. **E. autumnalis** *Hook. f. Fl. Nov. Zel.* i (1853) 239.—Stems stout, erect or pendulous, slightly compressed, 6–18 in. high. Leaves 2–4 in. long, $\frac{1}{3}$–$\frac{1}{2}$ in. broad, narrow-linear or narrow linear-lanceolate, acute, rigid, coriaceous, striate, midrib evident. Panicle terminal, stiff, 2–4 in. long, many-flowered; branches numerous, close-set; bracts sheathing, striate. Flowers sessile, much closer together than in *E. mucronata*, $\frac{1}{4}$–$\frac{1}{3}$ in. diam., waxy-white with a yellow centre, very fragrant. Sepals ovate-oblong, obtuse. Petals rather broader, obovate, narrowed at the base. Lip erect at the base and then bent outwards, broad, concave, very obscurely 3-lobed, disc with 2 crescent-shaped glands towards the base, margins undulate. Column short, stout. Pollinia pyriform, attached to a short caudicle at the base.—*Handb. N.Z. Fl.* (1864) 262. E. suaveolens *Lindl. in Bot. Reg.* (1843) Misc. 61; *Cheesem. Man. N.Z. Fl.* (1906) 666. E. alba *Col. in Trans. N.Z. Inst.* xviii (1886) 267. Epidendrum autumnale *Forst. f. Prodr.* (1786) n. 319. Cymbidium autumnale *Swartz in Nov. Act. Upsal.* vi (1799) 72; *A. Rich. Fl. Nouv. Zel.* (1832) 169.

North and South Islands, Stewart Island: Not uncommon in lowland forests from the North Cape southwards. Sea-level to 2000 ft. March–June.

A handsome species, easily distinguished from *E. mucronata* by the shorter and stouter habit, more rigid leaves, denser panicles, waxy-white flowers, and almost entire lip, which has two raised ridges near the base. Mr. Colenso apparently published his *E. alba* under the supposition that *E. suaveolens* has no glands on the lip, but they are always present. Some notes on the fertilization are given by Mr. G. M. Thomson in the Trans. N.Z. Inst. xi (1879) 418.

4. SARCOCHILUS R. Br.

Epiphytes. Stems short, rarely long; pseudobulbs wanting. Leaves distichous, flat, oblong or linear, coriaceous or fleshy. Flowers racemose or spicate; peduncles lateral. Sepals spreading, almost equal, free; the lateral ones often broader at the base and adnate to the produced foot of the column. Petals similar to the sepals or narrower. Lip attached to the base of the column, usually 3-lobed; lateral lobes small or large, fleshy or petaloid; middle lobe often greatly reduced; disc usually with callosities. Column erect, semiterete, not winged, produced at the base. Anther terminal, lid-like, 2-celled; pollinia 2, or 4 more or less connate in pairs, waxy, attached by a strap-shaped caudicle to the rostellum. Capsule linear or linear-oblong.

A genus of about 35 species, most of them from India, the Malay Archipelago and Australia; a few from the Pacific islands, and one from New Zealand.

1. **S. adversus** *Hook. f. Fl. Nov. Zel.* i (1853) 241.—Roots numerous, long, wiry, terete. Stems short, 1–3 in. long, concealed by the imbricated sheathing bases of the leaves. Leaves few, distichous, spreading, 1–2$\frac{1}{2}$ in. long, $\frac{1}{3}$–$\frac{3}{4}$ in. broad, linear-oblong to elliptic-oblong, obtuse or subacute, jointed above the sheathing base, thick and coriaceous, dark-green, often spotted with purple. Peduncles 1–4 from the axils of the lower leaves, slender, strict, 1–2$\frac{1}{2}$ in. long, 5–15-flowered; pedicels slender, erect; bracts small, broadly ovate. Flowers small, $\frac{1}{8}$–$\frac{1}{6}$ in. diam., green spotted with

purple. Sepals oblong-ovate, obtuse. Petals similar but slightly narrower. Lip as broad as long, obscurely 3-lobed, very concave, with a fleshy gland on each side; tip obtuse, somewhat hooded. Column very short, stout. Capsule linear-oblong, $\frac{1}{2}$–$\frac{2}{3}$ in. long.—*Handb. N.Z. Fl.* (1864) 263; *Cheesem. Man. N.Z. Fl.* (1906) 667. S. breviscapa *Col. in Trans. N.Z. Inst.* xiv (1882) 332.

North and South Islands, Stewart Island, Chatham Islands: Not uncommon in lowland forests from the North Cape southwards, usually on the trunks of trees. October–November.

5. **SPIRANTHES** L. C. Rich.

Terrestrial herbs, with fibrous or tuberous roots. Stems leafy or sometimes leafless at the time of flowering. Flowers small, spirally arranged in a terminal spike. Sepals subequal; the dorsal one erect, more or less connivent with the petals into a hood; lateral free, erect or spreading. Lip sessile or clawed, concave, closely embracing the column at its broad base, often spreading and dilated at the tip; disc usually with tubercles or lamellae near the base. Column short, terete. Anther erect, ovate or oblong, 2-celled; pollinia after dehiscence pendulous from the gland of the rostellum.

A genus of nearly 100 species, generally dispersed through most temperate or tropical regions.

1. **S. australis** *Lindl. in Bot. Reg.* (1843) t. 823.—Root of several stout and fleshy almost tuberous fibres. Stem variable in size, 6–20 in. high, stout or slender, glabrous or nearly so below the inflorescence. Lower leaves varying from 2 to 6, 2–6 in. long, narrow-linear or linear-lanceolate, acuminate, sheathing at the base; upper ones reduced to sheathing scales. Spike slender, 2–6 in. long or more, spirally twisted, glandular-pubescent. Flowers numerous, small, sessile, close-set or rather distant, $\frac{1}{10}$–$\frac{1}{8}$ in. long, rose-pink or white; bracts ovate, acuminate, usually as long as the flowers. Upper sepal oblong, obtuse, connivent with the petals into a hood; lateral free, acute. Lip broadly oblong, concave; the lower part embracing the column and bearing a small rounded gland on each side at the base; upper part spreading and thickened; margins usually much crisped. Ovary glandular.—*Hook. f. Fl. Tasm.* ii (1860) 15; *Handb. N.Z. Fl.* (1864) 272; *Benth. Fl. Austral.* vi (1873) 314; *Cheesem. Man. N.Z. Fl.* (1906) 667. S. novae-zealandiae *Hook. f. Fl. Nov. Zel.* i (1853) 243.

North Island: Auckland—Near Ohora, *T. F. C.*; Waipapakauri and Rangaunu Harbour, *H. Carse!* Kaitaia, *R. H. Matthews!* Great Barrier Island, *T. Kirk*; near Auckland, *T. F. C.*; Waihi, *H. B. Devereux!* Upper Waikato, *Colenso*; Rotorua, *T. F. C.*; Waimarino Plains, *E. Phillips Turner!* Taranaki—Swamps near New Plymouth; Ngaire Swamp, *T. F. C.* South Island: Lake Ellesmere and New Brighton, *A. Wall*; Okarito, *A. Hamilton.* Sea-level to 1500 ft. January–February.

Also found in Australia, and in many parts of tropical and temperate Asia.

6. **THELYMITRA** Forst.

Terrestrial herbs, usually glabrous. Root of oblong or ovoid tubers. Leaf solitary, linear or lanceolate, often thick and fleshy but not terete; empty sheathing bracts 1 or 2 along the stem. Flowers few or many in a terminal raceme, sometimes reduced to one. Sepals and petals similar

and equal or nearly so, spreading. Lip similar to the petals, quite free from the column at the base. Column short, erect, broadly 2-winged; the wings either produced behind the anther with a variously lobed or fringed or rarely entire margin, or with 2 prominent lateral lobes as long or longer than the anther; at the base the wings extend between the column and the lip and are united. Anther in front of the produced wing of the column or between its lateral lobes, erect, 2-celled; connective often produced; pollinia 2 in each cell, friable.

A genus of probably over 40 species, mostly natives of Australia and New Zealand, one species only being found in New Caledonia, and two in the Malay Archipelago. It is remarkable from the lip being quite free from the column and resembling the petals and sepals, so that the perianth has little of the irregular appearance of an orchid, but rather resembles that of an *Ixia* or *Sisyrinchium*. The New Zealand species are much alike in habit and general appearance, and in most cases cannot be distinguished from one another when out of flower, or when dried. Even when in the flowering state they require careful study before their differential characters can be understood. The following analysis is in several respects imperfect, but is the best that I can offer in the present state of our knowledge. I have in my herbarium specimens of several additional forms, but they cannot be safely described until more complete material is available.

A. Cucullaria. *Column-wing extending behind the anther and usually overtopping it, hood-shpaed, variously lobed or fringed, the lateral lobes tipped with a dense brush of cilia.*

Column-wing with 3 short denticulate or fimbriate lobes at the back between the lateral lobes .. .. 1. *T. ixioides.*
Column-wing with a broad entire or emarginate lobe between the lateral lobes, which are shorter than it .. .. .. 2. *T. longifolia.*
Column-wing with a truncate or bifid scarcely hood-shaped lobe between the lateral lobes, which are longer than it. Flowers rose-coloured .. .. 3. *T. intermedia.*
Column-wing with a hood-shaped lobe between the lateral lobes, which are much longer than it. Sepals and petals linear-oblong .. .. 4. *T. Colensoi.*
Column-wing with a high but narrow bifid lobe between the lateral lobes, which first project horizontally, and then are erect .. 5. *T. pauciflora.*
Column-wing with a broad hood-shaped lobe between the lateral lobes; margins thick, fleshy, and denticulate. Flowers blue, sometimes spotted with brown .. .. 6. *T. decora.*
Column-wing with 3 separate lobes between the lateral lobes. Lateral lobes long, narrow, flat, fringed with branched fimbriae. Flowers blue, column yellow and violet .. .. .. 7. *T. aemula.*
Column-wing with a broad truncate middle lobe tuberculate on the back between the lateral lobes. Flowers large, lavender-blue, 1–1¼ in. diam. .. .. 8. *T. caesia.*

B. Macdonaldia. *Column-wing extending behind the anther but shorter than it and not hood-shaped, variously lobed or crenate or fimbriate.*

Tall, slender, 9–18 in. high. Flowers large, ¾–1 in. diam., blue-purple. Lateral lobes of column-wing flat, irregularly toothed 9. *T. pulchella.*
Tall, slender, 9–18 in. high. Flowers ¾–1 in. diam., blue-purple. Lateral lobes of column-wing flat, margins with branched fimbriae .. .. 10. *T. pachyphylla.*
Flexuous and wiry, 4–10 in. high. Flowers 1–3, ½ in. diam., flesh-coloured .. .. 11. *T. imberbis.*

C. Biaurella. *Column-wing not extending behind the anther, but with 2 prominent erect lateral lobes.*

Flexuous and wiry, 4–6 in. high. Lateral lobes of column erect, thick, smooth, and fleshy .. .. 12. *T. Matthewsii.*
Tall, 1–2 ft. high. Flowers 6–10, large, 1 in. diam., blue .. 13. *T. venosa.*
6–15 in. high, 1–4-flowered. Lateral lobe of the column-wing not so high as the narrow anther .. .. 14. *T. uniflora.*

T. aristata Lindl. See Blanch. Fl. Auck. 2nd. Ed. 215. Reichb. f. Hatch. Proc. L.S. N.S.W. 70: 1945.

1. **T. ixioides** *Swz. in Vet. Akad. Handl. Stockh.* xxi (1800) 228, t. 3. —Stem tall, slender, 9–18 in. high. Leaf rather long but shorter than the stem, narrow-linear, thick, channelled in front. Flowers 2–8 or more in a raceme 2–6 in. long, rather large, ¾ in. diam. Sepals, petals, and lip broadly oblong or elliptic-oblong, obtuse or subacute. Column short, stout, not ½ as long as the perianth; the broad wing continued behind the anther and overtopping it, 3-lobed at the back and with a lateral lobe on each side at the front angle; lateral lobes the highest, pointing forwards and upwards, linear, tipped with a small dense tuft of cilia; the 3 intermediate lobes broader and shorter, truncate, denticulate or crenate, the middle one usually crested on the back. Anther rather narrow, pointed, much longer than the rostellum.—*Hook. f. Fl. Tasm.* ii (1860) 6, t. 103B; *Benth. Fl. Austral.* vi (1873) 317; *Fitzgerald Austral. Orch.* ii (1888) pt. 3; *Berggr. in Minneskr. Fisiog. Sallsk. Lund.* (1877) 22; *Cheesem. Man. N.Z. Fl.* (1906) 669.

North Island: Not uncommon on clay hills from Mangonui and Kaitaia southwards to the Waikato River, Rotorua, and Taupo, *Berggren, R. H. Matthews! Petrie! H. Carse! T. F. C.* Sea-level to 1000 ft. September–November. Also a common Australian plant.

A handsome plant, with large blue flowers sometimes spotted with brown. The intermediate lobes at the top of the column are tipped with bright-yellow, below which is a transverse band of violet.

2. **T. longifolia** *Forst. Char. Gen.* (1786) 98, t. 49. — Very variable in size and degree of robustness, short or long, stout or slender, 3–18 in. high. Leaf often overtopping the flowers in short-stemmed specimens, narrow-linear or linear-lanceolate, varying in breadth from ⅛–¾ in. diam. or even more, flat or involute, thick and coriaceous or fleshy, grooved and nerved. Flowers 2–16 in a raceme 1–6 in. long or sometimes solitary, variable in size, ⅓–¾ in. diam., colour varying from white to pink or blue. Sepals and petals oblong-ovate or ovate-lanceolate, acute or acuminate; lip usually somewhat broader and more obtuse. Column short, stout; the wing continued behind the anther and much longer than it, 3-lobed; the middle lobe the highest, broad, rounded, hood-shaped and projecting forwards over the anther, emarginate or shallowly 2-lobed, margins smooth, entire; lateral lobes short, linear, terminated by a dense brush of white cilia. Anther much exceeding the rostellum.—*Hook. f. Handb. N.Z. Fl.* (1864) 270; *Benth. Fl. Austral.* vi (1873) 319; *Fitzgerald Austral. Orch.* i (1880) pt. 6. T. Forsteri *Swz. in Vet. Akad. Handl. Stockh.* xxi (1800) 228; *A. Rich. Fl. Nouv. Zel.* (1832) 165, t. 25, f. 2; *A. Cunn. Precur.* (1838) n. 309; *Raoul Choix* (1846) 41; *Hook. f. Fl. Nov. Zel.* i (1853) 243; *Cheesem. Man. N.Z. Fl.* (1906) 669; *Ill. N.Z. Fl.* ii (1914) t. 192A. T. stenopetala *Hook. f. Fl. Antarct.* i (1844) 69. T. nemoralis *and* T. purpureo-fusca *Col. in Trans. N.Z. Inst.* xvii (1885) 249. T. cornuta *Col. l.c.* xx (1888) 206.

Var. **alba** *Cheesem. n. var.*—Similar to the above, but sepals light greenish-purple; petals pure-white.—T. alba *Col. in Trans. N.Z. Inst.* xviii (1886) 272.

North and South Islands, Stewart Island, Chatham Islands, Auckland Islands: Abundant from the Three Kings Islands and the North Cape southwards. Sea-level to 4000 ft. *Makaika.* November–December. Also in Australia and Tasmania.

3. **T. intermedia** *Berggr. in Minneskr. Fisiog. Sallsk. Lund.* (1877) 21, t. 5, f. 21–24.—Small, slender, 8–12 in. high, with much of the habit of slender forms of *T. pauciflora* and *T. longifolia.* Leaves narrow-linear, channelled in front. Flowers 3–4 in a narrow raceme 1–2 in. long, small, $\frac{1}{3}$–$\frac{1}{2}$ in. diam., pale rose-coloured. Column short, not $\frac{1}{2}$ as long as the perianth, the wing continued behind the anther but shorter than it, 3-lobed; intermediate lobe bifid, not crested nor hooded, margin smooth; lateral lobes longer, narrow, pointing forwards and upwards, terminated by a small and thin tuft of cilia.—*Cheesem. Man. N.Z. Fl.* (1906) 670.

North Island: Apparently rare and local. Kaitaia, *R. H. Matthews!* Fairburn, *H. Carse!* Bay of Islands, *Berggren;* Cowes, Waiheke, *J. H. Harvey!* Rotorua and Waiotapu, *Mrs. H. J. Matthews!*

This is best distinguished by the small rose-coloured flowers, the narrow bifid intermediate lobe of the column-wing, and the narrow sparingly ciliate lateral lobes of the column.

4. **T. Colensoi** *Hook. f. Handb. N.Z. Fl.* (1864) 271.—"Very slender, 8–12 in. high. Leaf very narrow-linear, flexuous. Flowers 1–3, yellowish, on slender pedicels, $\frac{1}{3}$ in. broad. Sepals and petals very narrow, linear-oblong, acute. Column very short; appendages very long, subulate, erect, plumose at the tip. Anther with a long point."—T. pauciflora *Hook. f. Fl. Nov. Zel.* i (1853) 244 (*not of R. Br.*).

North Island: *Colenso* (Handbook).

I have seen no specimens that I can refer to this, and in the absence of any additional information have reproduced the description given in the Handbook.

5. **T. pauciflora** *R. Br. Prodr.* (1810) 314.—Stems slender, wiry, flexuous, 6–15 in. high, rarely more. Leaf much shorter than the stem, narrow-linear, $\frac{1}{10}$–$\frac{1}{5}$ in. broad, rarely more, thick and fleshy, longitudinally grooved, deeply channelled in front and thus concave. Flowers 1–6, $\frac{1}{3}$ in. long, usually pale-blue or whitish-blue. Petals and sepals narrow-ovate or ovate-lanceolate, acute. Column short, stout, the wing continued behind the anther and longer than it, 3-lobed, the middle lobe much the largest and also the highest, narrower than in *T. longifolia,* thick and swollen, projecting over the anther, deeply emarginate or 2-lobed, brownish-red at the base, bright-yellow towards the tip; lateral lobes smaller at the base, projecting forwards almost horizontally, then suddenly bent upwards and erect, terminated by a dense brush of white cilia. Anther broad, connective produced into a short point.—*Cheesem. in Trans. N.Z. Inst.* xlviii (1916) 214.

North Island: *Leptospermum*-clad hills in the northern portion of the Auckland Provincial District, abundant north of the Waikato River, and probably extending much further south, *T. F. C., W. Townson! H. B. Matthews! H. Carse!* and others. October–November.

Closely allied to *T. longifolia,* with which it was united by Mr. Bentham. But it differs in its smaller size and more slender habit; in its narrower and deeply channelled leaf; in the smaller flowers; and especially in the middle lobe of the column-wing, which is deeply emarginate or 2-lobed, whereas it is much broader, more hood-shaped, and barely emarginate in *T. longifolia. T. pauciflora* is not uncommon in eastern Australia.

6. **T. decora** *Cheesem. Man. N.Z. Fl.* (1906) 1151.—Stem slender, 6–12 in. high or more. Leaf shorter than the stem, narrow-linear, thick and fleshy, channelled, $\frac{1}{6}$–$\frac{1}{3}$ in. broad; empty bracts 1–3, the upper broader

and more membranous. Flowers 1–4, about ½ in. diam., dark-blue, the two lateral petals obscurely spotted with brown. Sepals and petals ovate-oblong, subacute. Column short, stout, about ½ the length of the perianth, the wing continued behind the anther and longer than it, 3-lobed; middle lobe the shortest but exceeding the anther, hood-shaped, truncate, the margin thick and fleshy and denticulate, the back minutely warted, the anterior angle on each side slightly produced and acute; lateral lobes much larger than the middle lobe, pointing forwards, terminated by a dense rounded brush of cilia. Anther broad; connective terminating in a stout horn-like point.

North Island: Taumarere, Bay of Islands, *J. H. Harvey!* also at Cowes, Waiheke Island; Rotorua, *Mrs. H. J. Matthews!* Tirau, Upper Thames Valley, Waimarino Plains, hills near the base of Ngauruhoe, summit of Mount Kakaramea, altitude 4500 ft., *T. F. C.* Altitudinal range, sea-level to 4500 ft. December–January.

7. **T. aemula** *Cheesem. in Trans. N.Z. Inst.* li (1919) 94.—Stems stout or slender, 6–16 in. high. Leaf shorter than the stem, narrow-linear, thick, channelled in front. Cauline leaves or empty bracts 2, short, sheathing. Flowers 3–8, about ½ in. diam., blue, rather closely placed in a raceme 1½–4 in. long. Sepals or petals oblong or ovate-oblong, obtuse or subacute. Column short, stout, broad at the base, narrowed above, winged, the wing extending behind the anther and free from it, except at the base, 5-lobed; the 2 lateral lobes twice the length of the others, flat, narrow, erect, fringed with numerous branched fimbriae; middle lobe short and broad, thickened and denticulate at the tip, smooth or minutely tuberculate on the back; the two intermediate lobes distinct from the central one, broad, thick and fleshy, jagged at the top. Anther broad, connective produced into a pointed tip that just overtops the level of the median lobe of the column-wing.

North Island: *Leptospermum*-clad hills from Kaitaia (Mongonui County) to Auckland, *H. B. Matthews! T. F. C.*

Doubtless closely allied to *T. ixioides* and the Australian *T. canaliculata*, but differing in the lateral lobes of the column being much longer, flattened and more copiously penicillate; and the middle lobe, although denticulate at the top, is not conspicuously warted or crested at the back. The flowers appear to be invariably blue; but the column is surrounded by a narrow band of violet just below the lobes, above which the colour is bright-yellow.

8. **T. caesia** *Petrie in Trans. N.Z. Inst.* li (1919) 107.—Stem tall, slender, 1–3 ft. high. Leaf shorter than the stem, sheathing at the base, linear, fleshy, concave and grooved above. Empty bracts 2–3, sheathing, acuminate. Flowers 4–5, large, handsome, lavender-blue, 1–1¼ in. diam. Sepals and petals oblong or oblong-ovate, acute or subacute or apiculate. Column short, stout, not ½ the length of the perianth, wing continued behind the anther but shorter than it, 3-lobed; middle lobe broad, thick and fleshy, tuberculate on the back, subtruncate along the top, yellowish-brown; lateral lobes as long as the anther, thin and flattened, margins cut into numerous fimbriate branched processes. Anther broad, connective produced into a slightly grooved tip.

North Island: *Leptospermum*-clad hills at Birkdale, near Auckland, *H. B. Matthews!*

9. **T. pulchella** *Hook. f. Fl. Nov. Zel.* i (1853) 244.—Stem tall, slender, often flexuous, 9–18 in. high or even more. Leaf shorter than the stem, long, linear, fleshy, grooved and channelled; empty bracts 2–3, sheathing. Flowers 3–8 in a raceme from 2–6 in. long, large, handsome, blue-purple, ¾–1 in. diam. Sepals and petals broadly oblong or obovate, obtuse. Column less than ½ as long as the perianth, the wing continued behind the anther but much shorter than it, 3-lobed; middle lobe short and broad, emarginate or truncate; lateral lobes much longer than the middle lobe and almost equalling the anther, erect, lanceolate, acuminate, coarsely toothed. Anther broad, connective produced into a stout horn-like point. —*Handb. N.Z. Fl.* (1864) 271; *Cheesem. Man. N.Z. Fl.* (1906) 670; *Ill. N.Z. Fl.* ii (1914) t. 192B.

North Island: Clay hills from the North Cape to Rotorua, not uncommon. Sea-level to 1200 ft. November–December.

A handsome and well-marked species, easily distinguished by the large blue-purple flowers, broad obtuse petals and sepals, long erect coarsely jagged (not ciliate) lateral lobes of the column-wing, and broad and short middle lobe, which is much lower than the anther. I have seen no South Island specimens, and suspect that Monro's and Lyall's plants, mentioned by Hooker in the Handbook, are referable to *T. pachyphylla.*

10. **T. pachyphylla** *Cheesem. Man. N.Z. Fl.* (1906) 1151.—Stem tall, stout or rather slender, 9–18 in. high or more. Leaf shorter than the stem, usually very thick and fleshy, grooved and channelled, variable in breadth, sometimes as much as ¾ in. across; empty bracts 2 or 3, thick and fleshy, sheathing. Flowers 3–6 or more in a raceme, large and handsome, ¾–1 in. diam., blue-purple. Sepals and petals oblong-ovate or broadly oblong, subacute. Column short, stout, about ½ as long as the perianth, the wing continued behind the anther but hardly as long as it, 3-lobed; middle lobe short, broad, indistinctly hood-shaped, truncate at the top with an even or denticulate margin; lateral lobes longer than the middle one, erect or pointing forwards, flattened, the margins provided with numerous simple or branched fimbriae. Anther broad; connective produced into a stout horn-like point which usually overtops the middle lobe of the column-wing.

South Island: Nelson—Vicinity of Westport, abundant, *W. Townson!* Westland —Kumara, *J. W. Brame!*

This has been confused with *T. pulchella*, from which, however, it totally differs in the structure of the column. In *T. pulchella* the middle lobe of the column-wing is much shorter than the anther, while the lateral lobes are barely as long as it, and are irregularly toothed or jagged, and not at all ciliate or fimbriate. In the present species the middle lobe almost equals the anther, while the lateral lobes are longer than it, and are provided with numerous fimbriae.

11. **T. imberbis** *Hook. f. Fl. Nov. Zel.* i (1853) 244.—Stem slender, wiry, often flexuous, 4–12 in. high. Leaf much shorter than the stem, narrow-linear, flexuous, thick and fleshy, grooved in front. Flowers 1–3, rarely more, short and broad, cup-shaped, ½ in. diam., flesh-coloured, rarely white or cream-coloured. Sepals and petals ⅓ in. long, broadly oblong or obovate-oblong, obtuse or apiculate. Column less than ½ as long as the perianth; the wing continued behind the anther but shorter than it, 3-lobed; middle lobe broad, truncate or obscurely 2-lobed, minutely warted upon the back, margin thick, entire; lateral lobes longer, pointing forwards and upwards, triangular, acute, irregularly denticulate,

Lee. L. S. NSD. 90-1945.

without cilia. Anther large, connective produced into a blunt point much exceeding the column-wing.—*Handb. N.Z. Fl.* (1864) 271; *Cheesem. Man. N.Z. Fl.* (1906) 671.

North Island: Clay hills from the North Cape to Rotorua, not uncommon. Sea-level to 1500 ft. October–November.

In the original description the flowers are said to be yellow, but they are usually flesh-coloured. It is very closely allied to the Australian *T. carnea*, and may be identical with it.

12. **T. Matthewsii** *Cheesem. in Trans. N.Z. Inst.* xliii (1910) 177.—Stem wiry, flexuose, 4–6 in. high. Leaf solitary, sheathing the stem at the base, the sheath finely and closely puberulous; lamina 1½–2½ in. long, much expanded at the base, and then suddenly narrowed into a linear blade, which is usually spirally twisted so as to coil round the stem; margins involute. Bracts 2, the lower one below the middle of the stem, the upper almost close to the flower, both broad and sheathing. Flower solitary, large for the size of the plant, ½–¾ in. diam. Perianth-segments all similar, lanceolate or oblong-lanceolate, acute or shortly acuminate, dark purplish-blue with darker longitudinal veins. Column much shorter than the perianth-segments, not produced at the back behind the anther, but furnished with two large lateral lobes which equal the anther in height, and which are oblong or oblong-falcate, obtuse, somewhat flattened but thick and fleshy, not lobed nor furnished with cilia. Sometimes there are evidences of a slight crest connecting the lateral lobes at the base. Anther very large, oblong, obtuse. Base of column purplish; lateral lobes and anther bright-yellow.

North Island: Mongonui County, low hills between Lake Tongonge and the coast, rare, *R. H. Matthews* and *H. B. Matthews*.

A charming little plant, worthily dedicated to its discoverer, who has added more to our knowledge of the New Zealand orchids than any other observer of late years. It is closely allied to the Western Australian *T. variegata*, principally differing in the much smaller size, in the solitary flowers, and in the column not crested on the back.

13. **T. venosa** *R. Br. Prodr.* (1810) 314.—Stem stout or slender, 9–18 in. high or more. Leaf shorter than the stem, narrow-linear, thick, channelled. Flowers 3–6, large, handsome, purplish-blue, 1 in. diam. Sepals and petals ½ in. long, oblong or elliptic-oblong, obtuse or minutely apiculate, conspicuously veined; lip obovate, obtuse. Column short, stout, not ½ the length of the perianth; wing not continued behind the anther, but with 2 erect lateral lobes which exceed the anther, lobes narrow-triangular, 1–2-toothed near the tip, which usually is spirally twisted inwards. Anther rather short, ovate, connective narrowed into a short bifid beak not so long as the two lateral lobes.—*Benth. Fl. Austral.* vi (1873) 323; *Cheesem. Man. N.Z. Fl.* (1906) 671. Epiblema grandiflorum *Buch. in Trans. N.Z. Inst.* xiv (1882) 357 (*not of R. Br.*).

North Island: Rukuhia Swamp, near Hamilton, *H. B. Matthews! T. F. C.*; also *Sphagnum* swamps at Tirau and Rotorua, Omatangi, near Lake Taupo, *Berggren*. Taranaki—Ngaire Swamp, *T. F. C.* Wellington—Mungaroa Swamp, *H. H. Travers, T. Kirk!* Altitudinal range 500–2000 ft. December–January.

14. **T. uniflora** *Hook. f. Fl. Antarct.* i (1844) 70.—Stem slender, 6–12 in. high or more. Leaf much shorter than the stem, very narrow-linear, channelled. Flowers 1–4, large, handsome, blue-purple, ¾ in. diam. Sepals

and petals obovate-oblong, obtuse or apiculate, veined; lip broader, obovate. Column short and stout, less than ½ the length of the perianth, wing reduced to 2 linear-triangular lateral lobes not connected by a rim or crest behind the anther, tip obscurely notched, usually twisted inwards. Anther large, broadly ovate, the connective produced into a bifid beak which overtops the lateral lobes.—*Fl. Nov. Zel.* i (1853) 244; *Handb. N.Z. Fl.* (1864) 271; *Cheesem. Man. N.Z. Fl.* (1906) 672; *Ill. N.Z. Fl.* ii (1914) t. 193A.

North and South Islands, Stewart Island, Auckland Islands: From Rotorua southwards, abundant in upland districts. Sea-level to 3500 ft. December–January.

The name *uniflora* is misleading, as the flowers are often more than one. The species is very closely allied to the Tasmanian *T. cyanea* Lindl. (Hook. f. Fl. Tasm. (1860) t. 102), and may prove identical with it.

7. **ORTHOCERAS** R. Br.

Glabrous terrestrial herbs. Root of 1 or 2 ovoid tubers and numerous fleshy fibres. Leaves few, near the base of the stem, narrow-linear. Flowers rather large, sessile in a lax spike; bracts sheathing, acute. Upper sepal erect, incurved, deeply concave; lateral longer, narrow-linear or almost filiform, terete, erect. Petals short, erect, narrow, flat. Lip affixed to the base of the column, spreading, 3-lobed; lateral lobes broad; middle lobe large, ovate; disc with a thick callus. Column short, stout, upper part with 2 lateral erect lobes equalling the anther. Anther large, erect or slightly incurved, 2-celled; pollinia powdery.

One species only is known, found in both Australia and New Zealand.

1. **O. strictum** *R. Br. Prodr.* (1810) 317.—Stem stout or slender, rigid, erect, wiry, 9–24 in. high. Leaves several near the base of the stem, sheathing, 2–9 in. long, linear or almost filiform, channelled, margins involute; above the leaves there are usually 2 or 3 long sheaths with short erect laminae. Spike 1–9 in. long, 3–12-flowered; flowers rather lax, green, greenish-purple or brownish-purple; bracts acuminate, the lower ones usually exceeding the ovary. Upper sepal ⅓–½ in. long, when spread out almost orbicular, much incurved, deeply concave; lateral filiform, erect or diverging, ½-1 in. long. Petals thin, notched at the tip. Lip spreading or deflexed; lateral lobes broad, oblique; middle lobe much larger, ovate; disc with a large variously shaped callus.—*A. Cunn. Precur.* (1836) n. 310; *Benth. Fl. Austral.* vi (1873) 332; *Fitzgerald Austral. Orch.* i (1880) pt. 3; *Cheesem. Man. N.Z. Fl.* (1906) 672. O. Solandri *Lindl. Gen. et Sp. Orch.* (1830) 512; *Hook. f. Fl. Nov. Zel.* i (1853) 243; *Handb. N.Z. Fl.* (1864) 273. O. rubrum *Col. in Trans. N.Z. Inst.* xviii (1886) 273. O. caput-serpentis *Col. l.c.* xxii (1890) 490. Diuris novae-zealandiae *A. Rich. Fl. Nouv. Zel.* (1832) 163, t. 25, f. 1.

North Island: Dry hills from the North Cape southwards, not uncommon. South Island: Various localities in the Nelson Provincial District, *Bidwill, T. Kirk! T. F. C.* Sea-level to 2500 ft. December–January.

This species ranges in Australia from the north of New South Wales to Victoria and South Australia. According to Mr. Bentham, the plants from the two countries do not differ in the slightest particular.

M. pavillosa R. Br. Prodr. 1810. 321.
in N.Z. accidg. to Hupk. Orchidographer
See Black. Fl. S. Austr. p. 21. 2nd Ed. p. 217

8. **MICROTIS** R. Br.

Glabrous terrestrial herbs; root of rounded tubers on fleshy fibres. Leaf solitary, long, narrow, terete, opened out near the stem and then continuous with the closed sheath. Flowers small, green, numerous, densely spicate, usually spreading or reflexed. Upper sepal erect, broad, concave, incurved; lateral lanceolate or oblong, spreading or recurved. Petals similar to the lateral sepals or smaller. Lip sessile at the base of the column, spreading, oblong, obtuse, truncate or 2-lobed, usually with calli near the base. Column very short, almost terete, upper part with 2 auricles or wings. Anther terminal, erect, 2-celled; pollinia 4, powdery.

The genus consists of 6 species inhabiting Australia, one of them extending to New Zealand. A seventh species has also been described from the Malay Archipelago. The genus has the habit and general appearance of *Prasophyllum*, but differs in the flowers not being reversed, and in the auricles of the column.

1. **M. unifolia** *Reichenbach f. Beitr. Syst. Pfl.* 62.—Very variable in size, degree of robustness, and number of flowers. Stems stout or slender, 3–24 in. high. Leaf terete, fistular, exceeding the spike or shorter than it. Spike ½–6 in. long; flowers few or many, close-set or rather distant, minute, green, pedicels short; bracts small. Upper sepal broadly ovate, acute, deeply concave; lateral oblong, deflexed. Petals shorter, spreading. Lip horizontal or deflexed, oblong, obtuse or 2-lobed; margins much crisped; disc with 2 calli at the base and usually with an irregularly shaped tubercle or swelling near the tip. Column very short, stout; upper part with 2 small auricles. Pollinia attached to a very short caudicle.—M. porrifolia *R. Br. Prodr.* (1810) 320; *Hook. f. Fl. Nov. Zel.* i (1853) 245; *Handb. N.Z. Fl.* (1864) 266; *Benth. Fl. Austral.* vi (1873) 347; *Fitzgerald Austral. Orch.* ii (1888) pt. 1; *Cheesem. Man. N.Z. Fl.* (1906) 673. M. Banksii *A. Cunn. in Bot. Mag.* (1835) sub. t. 3377, *and Precur.* (1836) n. 311; *Raoul Choix* (1846) 41. M. longifolia *Col. in Trans. N.Z. Inst.* xvii (1885) 247. M. papillosa *Col. l.c.* xviii (1886) 269. Epipactis porrifolia *Swz. in Vet. Acad. Stockh.* (1800) 233. Ophrys unifolia *Forst. f. Prodr.* (1786) n. 311.

Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Abundant throughout. Sea-level to 2500 ft. October–December.

There appear to be differences in the shape and size of the calli on the lip, the shape of its extremity, and the extent to which the margin is crisped. The fertilization has been described by Thomson in Trans. N.Z. Inst. xi (1879) 422.

9. **PRASOPHYLLUM** R. Br.

Terrestrial glabrous herbs. Root of globose or ovoid tubers. Leaf solitary; sheath usually long; lamina terete, long or short, sometimes reduced to a short erect point. Flowers small, sessile in a lax or dense spike, reversed so that the lip is uppermost, usually abruptly bent at the top of the ovary and consequently spreading or reflexed. Upper sepal (inferior by the reversion of the flower) lanceolate or oblong, concave, usually arched over the column; lateral (superior) as long or rather longer, lanceolate or linear, free or more or less connate. Petals equalling the sepals or shorter, lanceolate or linear. Lip superior, sessile or shortly clawed, or sessile on the produced foot of the column, usually erect at the base and concave, spreading or recurved above, ovate or lanceolate, undivided; margins entire or undulate; disc with an adnate plate or longitudinally thickened

along the median line. Column very short, not winged, but furnished with 2 erect lateral lobes; rostellum usually long, erect. Anther erect, placed behind the rostellum which often exceeds it, 2-celled; pollinia attached by a linear caudicle to the rostellum.

Species about 30, all confined to Australia, with the exception of 2 from New Caledonia, and 4 from New Zealand, 2 of which seem to be the same as Australian species. The genus is closely allied to *Microtis*, but is at once distinguished by the reversed flowers and large lateral lobes to the column.

A. Euprasophyllum. *Lip sessile at the base of the column. Perianth* $\frac{1}{3}$–$\frac{1}{2}$ *in. long.*

Tall, 1–3 ft. high. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. Lip large, with a conspicuous recurved lamina; adnate plate not nearly reaching the tip .. 1. *P. patens.*
Smaller, 4–12 in. Flowers $\frac{1}{5}$ in. Lip shorter, with a smaller recurved lip; adnate plate extending almost to the tip .. .. 2. *P. Colensoi.*

B. Genoplesium. *Leaf reduced to a sheathing bract just under the spike. Lip articulated on to a flat ribband-like projection from the base of the column, usually mobile. Flowers very small,* $\frac{1}{10}$–$\frac{1}{12}$ *in. long.*

Perianth pointing downwards, green. Lateral sepals ovate-lanceolate, not tipped with a gland. Lip oblong .. .. .. 3. *P. pumilum.*
Perianth horizontal, reddish. Lateral sepals narrow-lanceolate, acuminate, tipped by a minute gland. Lip lanceolate .. 4. *P. rufum.*

1. **P. patens** *R. Br. Prodr.* (1810) 318.—Stem stout or slender, 1–3 ft. high. Leaf sheathing the stem half-way up or rather more, the lamina shorter or longer than the spike. Spike rather lax, 2–5 in. long, many-flowered; bracts small, broad, obtuse. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. long, pale yellowish-green or whitish, sweet-scented. Ovary obovoid. Upper sepal ovate, acute, concave; lateral rather longer, lanceolate, quite free. Petals linear-oblong, obtuse. Lip sessile, as long as the sepals, erect at the base and then suddenly reflexed between the lateral sepals; adnate plate narrower than the disc and not extending much further up than the flexure of the lip; margins broad, thin, undulate. Column short; lateral lobes linear-oblong, obtuse, almost as long as the narrow erect rostellum, entire. Anther large, pointed, not quite equalling the rostellum.—*Hook. f. Fl. Tasm.* ii (1860) 11, t. 111; *Benth. Fl. Austral.* vi (1873) 339; *Cheesem. Man. N.Z. Fl.* (1906) 675.

North Island: Auckland—Swamps at Maungatapere, Whangarei, *H. Carse!* Great Barrier Island, *T. Kirk!* Paeroa Range, near Waiotapu, *K. W. Allison!* Taranaki—Ngaire Swamp, abundant, *T. F. C.* December–January.

Easily distinguished from *P. Colensoi* by the much greater size, larger paler flowers, and longer lip, which has a much more conspicuous recurved lamina, the adnate plate not extending to the tip. The lateral lobes of the column are also much longer. It agrees well with Australian specimens of *P. patens*, except that the spike is usually denser.

2. **P. Colensoi** *Hook. f. Fl. Nov. Zel.* i (1853) 241.—Stem stout or slender, erect, 4–14 in. high. Leaf sheathing the stem for $\frac{3}{4}$ its length or even more; lamina shorter than the spike or equalling it. Spike 1–3 in. long, many-flowered; bracts as short as the pedicel, broad, obtuse. Flowers about $\frac{1}{5}$ in. long, dull-green or greenish-brown, slightly fragrant; ovary obovoid, gibbous. Upper sepal ovate-oblong, acute, concave; lateral rather longer, connate at the very base, lanceolate, acute, curved backwards. Petals linear-oblong, obtuse. Lip shorter than the sepals, sessile, ovate, tip acuminate, shortly recurved, adnate plate extending almost to the tip, margins undulate. Column very short, lateral lobes

See Hatch Trans 7.5 : 369 : 1943

not common. April [illegible].

4. **P rufum** *R. Br. Prodr.* (1810) 319.—Very similar in size and habit to *P. pumilum*, and like it with the leaf reduced to a sheathing bract just below the spike, the lamina very short and subulate. Spike few- or many-flowered, $\frac{1}{2}$–$\frac{3}{4}$ in. long. Flowers still more minute than in *P. pumilum*, the perianth about $\frac{1}{12}$ in. long, horizontal, reddish or yellowish. Upper sepal ovate, acuminate, concave; the lateral much longer, quite free, lanceolate, acuminate, the points tipped with a small gland. Petals small, lanceolate, shorter than the upper sepal. Labellum articulate on a flat ribband-like projection from the foot of the column, mobile, lanceolate, acute, truncate at the base, adnate plate occupying most of the disc, thickest along the margins. Column very short, the lobes rather narrow, 2-toothed at the tip. Anther large, apiculate, overtopping the small rostellum.—*Benth. Fl. Austral.* vi (1873) 344; *Fitzgerald Austral. Orch.* ii (1891) pt. 4; *Cheesem. Man. N.Z. Fl.* (1906) 676. P. nudum *Hook. f. Fl. Nov. Zel.* i (1853) 242; *Handb. N.Z. Fl.* (1864) 272. P. tunicatum *Hook. f. Fl. Nov. Zel.* i (1853) 242. (?) P. variegatum *Col. in Trans. N.Z. Inst.* xx (1888) 208.

North Island: Auckland—Birkdale, a few specimens only, *H. B. Matthews!* Waimarino Plains, *E. Phillips Turner!* Paeroa Range, *K. W. Allison!* Hawke's Bay—Lake Tutira, *H. Guthrie-Smith!* Wellington—Lake Taupo, Te Hawara, Port Nicholson, *Colenso* (Handbook); Kaitoke; Day's Bay, *B. C. Aston.* South Island: Marlborough—Port Underwood and Kenepuru, *J. H. Macmahon!* Nelson—Westport, *J. E. Holloway!*

This corresponds fairly well with the plate of *P. rufum* given by Mr. Fitzgerald in his "Australian Orchids." It is distinguished from the preceding species by the smaller horizontal usually reddish flowers, narrower lateral sepals tipped by a minute gland, much narrower lip, the adnate plate on which is thickest on the edges, and in the narrower lateral lobes of the column.

along with plac at'

PRASOPHYLLUM R.Br.
KEY TO THE NEW ZEALAND SPECIES

1. Labellum sessile, lamina reddish-green . . . . . 2.
   Labellum on a very short, rigid claw, lamina broad, white, margins prominently crenulate . . . . . suttonii
   Labellum on a narrow, movable claw . 3.
2. Margins flat, callus pale, extending only to the curve . . . . . rogersii
   Margins undulate, callus green, extending almost to the tip . . . . . colensoi
3. Labellum green, mucronate, margins entire, callus of several inconspicuous ridges . . . . . pumilum
   Labellum dark-red, acuminate, margins ciliate at the tip, callus with a prominent linear cleft . . . nudum

E. D. Hatch, Trans. Roy. Soc. N.Z., Vol.76, Pt.3, pp.289-293.

[illegible], as long as the sepals, erect at the base and then suddenly reflexed between the lateral sepals; adnate plate narrower than the disc and not extending much further up than the flexure of the lip; margins broad, thin, undulate. Column short; lateral lobes linear-oblong, obtuse, almost as long as the narrow erect rostellum, entire. Anther large, pointed, not quite equalling the rostellum.—*Hook. f. Fl. Tasm.* ii (1860) 11, t. 111; *Benth. Fl. Austral.* vi (1873) 339; *Cheesem. Man. N.Z. Fl.* (1906) 675.

North Island: Auckland—Swamps at Maungatapere, Whangarei, *H. Carse!* Great Barrier Island, *T. Kirk!* Paeroa Range, near Waiotapu, *K. W. Allison!* Taranaki—Ngaire Swamp, abundant, *T. F. C.* December–January.

Easily distinguished from *P. Colensoi* by the much greater size, larger paler flowers, and longer lip, which has a much more conspicuous recurved lamina, the adnate plate not extending to the tip. The lateral lobes of the column are also much longer. It agrees well with Australian specimens of *P. patens*, except that the spike is usually denser.

2. **P. Colensoi** *Hook. f. Fl. Nov. Zel.* i (1853) 241.—Stem stout or slender, erect, 4–14 in. high. Leaf sheathing the stem for ¾ its length or even more; lamina shorter than the spike or equalling it. Spike 1–3 in. long, many-flowered; bracts as short as the pedicel, broad, obtuse. Flowers about ⅕ in. long, dull-green or greenish-brown, slightly fragrant; ovary obovoid, gibbous. Upper sepal ovate-oblong, acute, concave; lateral rather longer, connate at the very base, lanceolate, acute, curved backwards. Petals linear-oblong, obtuse. Lip shorter than the sepals, sessile, ovate, tip acuminate, shortly recurved, adnate plate extending almost to the tip, margins undulate. Column very short, lateral lobes

See Hatch Trans 75 : 369 : 1945
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broadly notched, shorter than the rostellum. Anther broad, obtuse, not equalling the rostellum.—*Handb. N.Z. Fl.* (1864) 272; *Cheesem. Man. N.Z. Fl.* (1906) 675; *Ill. N.Z. Fl.* ii (1914) t. 193B.

North and South Islands, Stewart Island, Antipodes Island: From the North Cape southwards, but rare and local to the north of Lake Taupo. Sea-level to 4500 ft. November–January.

A most abundant subalpine plant all through the mountains of the South Island. For some remarks on the fertilization, see a paper by Mr. Thomson in the Trans. N.Z. Inst. xi (1879) 435.

3. **P. pumilum** *Hook. f. Fl. Nov. Zel.* i (1853) 242.—Very slender, 6–16 in. high. Stem with a lacerated fibrous sheath at the base. Leaf reduced to a sheathing bract near the spike; lamina ½–1 in. long, erect, usually reaching about half-way up the spike. Spike dense, few- or many-flowered, ½–1½ in. long. Flowers minute, the perianth about $\frac{1}{10}$ in. long, curved, pointing downwards, greenish. Upper sepal ovate, acuminate, concave; lateral rather longer, free, ovate-lanceolate, acuminate. Petals the same shape as the lateral sepals, but shorter, and with the tips almost aristate. Lip articulate on a flat ribband-like projection from the foot of the column, mobile, oblong, acute, truncate at the base, not ciliate, disc almost wholly occupied by a thick adnate plate, which is obscurely 3-grooved towards the base. Column short, the lateral lobes broad, obliquely truncate and irregularly 2-3-notched at the tip. Anther large, apiculate, overtopping the small rostellum.—*Handb. N.Z. Fl.* (1864) 273; *Cheesem. Man. N.Z. Fl.* (1906) 675; *Ill. N.Z. Fl.* ii (1914) t. 194A.

North Island: Auckland—Dry hills from the North Cape to the Middle Waikato, not common. April–June.

4. **P rufum** *R. Br. Prodr.* (1810) 319.—Very similar in size and habit to *P. pumilum*, and like it with the leaf reduced to a sheathing bract just below the spike, the lamina very short and subulate. Spike few- or many-flowered, ½–¾ in. long. Flowers still more minute than in *P. pumilum*, the perianth about $\frac{1}{12}$ in. long, horizontal, reddish or yellowish. Upper sepal ovate, acuminate, concave; the lateral much longer, quite free, lanceolate, acuminate, the points tipped with a small gland. Petals small, lanceolate, shorter than the upper sepal. Labellum articulate on a flat ribband-like projection from the foot of the column, mobile, lanceolate, acute, truncate at the base, adnate plate occupying most of the disc, thickest along the margins. Column very short, the lobes rather narrow, 2-toothed at the tip. Anther large, apiculate, overtopping the small rostellum.—*Benth. Fl. Austral.* vi (1873) 344; *Fitzgerald Austral. Orch.* ii (1891) pt. 4; *Cheesem. Man. N.Z. Fl.* (1906) 676. P. nudum *Hook. f. Fl. Nov. Zel.* i (1853) 242; *Handb. N.Z. Fl.* (1864) 272. P. tunicatum *Hook. f. Fl. Nov. Zel.* i (1853) 242. (?) P. variegatum *Col. in Trans. N.Z. Inst.* xx (1888) 208.

North Island: Auckland—Birkdale, a few specimens only, *H. B. Matthews!* Waimarino Plains, *E. Phillips Turner!* Paeroa Range, *K. W. Allison!* Hawke's Bay—Lake Tutira, *H. Guthrie-Smith!* Wellington—Lake Taupo, Te Hawara, Port Nicholson, *Colenso* (Handbook); Kaitoke; Day's Bay, *B. C. Aston.* South Island: Marlborough—Port Underwood and Kenepuru, *J. H. Macmahon!* Nelson—Westport, *J. E. Holloway!*

This corresponds fairly well with the plate of *P. rufum* given by Mr. Fitzgerald in his "Australian Orchids." It is distinguished from the preceding species by the smaller horizontal usually reddish flowers, narrower lateral sepals tipped by a minute gland, much narrower lip, the adnate plate on which is thickest on the edges, and in the narrower lateral lobes of the column.

10. **CALEANA** R. Br.

Glabrous terrestrial herbs. Root of small rounded tubers on fleshy fibres. Leaf solitary, linear or lanceolate or oblong. Flowers solitary or 2–4 in a terminal raceme; bracts acute. Sepals and petals subequal, all linear; the upper sepal erect, the lateral sepals and petals spreading or deflexed (but the position apparently reversed through the ovary being recurved). Lip uppermost, jointed on to the base of the column or to a projection from it, mobile; claw linear, incurved; lamina ovate or oblong, peltate, undivided, entire, smooth or tuberculate. Column elongate, sometimes produced at the foot, broadly winged throughout its whole length, concave. Anther terminal, erect, 2-celled; pollinia 2-partite, granular.

A small genus of 4 species, all of them natives of Australia, 1 extending to New Zealand.

1. **C. minor** *R. Br. Prodr.* (1810) 329.—Stem slender, wiry, almost filiform, 2–8 in. high, usually tinged with red. Leaf radical, about $\frac{1}{2}$ as long as the stem, rather fleshy, channelled. Flowers 1–4, about $\frac{1}{3}$ in. long including the ovary, greenish tinged with red, reversed; pedicels $\frac{1}{4}$-$\frac{1}{2}$ in.; bracts minute, acute. Sepals and petals narrow-linear, slightly dilated above the middle, nearly equal; upper sepal attached just above the top of the ovary, the lateral affixed to the basal projection of the column. Lip uppermost, very remarkable in shape; the lower portion claw-like and articulated on to the basal projection of the column; the upper part expanded into a broad lamina which is peltately attached to the claw; lamina convex above and covered with close-set reddish tubercles, which are largest towards the margins, under-surface smooth, concave. Column rather long, with a broad basal projection, broadly winged all round, concave, forming a horizontally placed cup or pouch.—*Benth. Fl. Austral.* vi (1873) 366; *T. Kirk in Trans. N.Z. Inst.* xxiv (1893) 425; *Cheesem. in Trans. N.Z. Inst.* xxiv (1892) 411, *and Man. N.Z. Fl.* (1906) 677.

North Island: Auckland—Kaitaia, *R. H. Matthews! H. Carse!* Rotorua, *Spencer!* Waiotapu, *H. J. Matthews!* December–January.

A most remarkable little plant. The column is horizontally placed, forming a broad pouch; the lamina of the lip, when at rest, is elevated by the slender elastic claw, and swings directly above it. When an insect alights on the lamina it overbalances, shutting up the insect within the concavity of the column. For a full account of the fertilization of the genus, reference should be made to Mr. Fitzgerald's magnificent work on Australian Orchids (vol. i, pt. 6).

11. **PTEROSTYLIS** R. Br. (1810) 326. nom. cons.

Terrestrial leafy herbs. Root of small rounded tubers on long fleshy fibres. Leaves radical and cauline, either all similar or the radical broader and ovate or oblong, often subrosulate; the cauline lanceolate or linear or reduced to sheathing bracts. Flowers large or small, greenish, usually solitary, rarely several in a terminal raceme. Upper sepal erect, incurved, concave, conniving with the petals and forming a broad boat-shaped hood (*galea*). Lateral sepals adnate at the base to the foot of the column, more or less connate into an erect or recurved 2-lobed lower lip; the lobes often drawn out into long acuminate points. Petals lanceolate, falcate. Lip attached by a short claw to the basal projection of the column, mobile; lamina linear or oblong, produced at the base above the claw into a long or short usually curved appendage. Column elongated, incurved, furnished

See Hatch, T.R.S. N.Z. 77: 234–246 for revision.

" Reuph Orch. N.S.W.

on each side of the rostellum with a quadrangular or hatchet-shaped membranous wing, the base produced into a horizontal projection. Stigma on the face of the column below the wings, oblong. Anther terminal, erect, 2-celled; pollinia 4, granular, free.

About 50 species are known. Of the 13 found in New Zealand, 2 are common Australian plants, the others are endemic. The remainder of the genus is Australian, with the exception of 2 species in New Caledonia. The mode of fertilization is most curious, and is well worth an attentive study. The upper sepal and petals connive, and form a hood, at the back of which the column is situated. The irritable lip hangs out of the entrance to the flower, and forms a convenient landing-place for insects. When touched by an insect it springs up, carrying the insect with it, and imprisoning it within the flower. The insect can only escape by crawling up the column and passing between the two membranous projecting wings, emerging directly in front of the anther. In doing this, it is first smeared with viscid matter from the projecting rostellum, and then drags away the pollinia, which can hardly fail to adhere to its sticky body. When visiting another flower, it must pass over the stigma before escaping, and is almost certain to leave some of the pollinia on its viscid surface. For a fuller account, see a paper by myself in *Trans. N.Z. Inst.* v (1873) 352.

A. Antennaea. *Lower lip erect, its lobes narrowed into long points embracing the galea.*

* No broad radical leaves. Cauline leaves linear, grass-like, sheathing the whole stem.

Tall, 6–18 in. Leaves $\frac{1}{4}$–$\frac{1}{2}$ in. broad. Flower large, 2–3 in. long; sepals and petals produced into long filiform points.. .. 1. *P. Banksii.*
Short, stout, 4–10 in. Leaves $\frac{1}{2}$–$\frac{3}{4}$ in. broad. Flower small, $\frac{3}{4}$–$1\frac{1}{4}$ in. long; sepals and petals with short subulate points.. 2. *P. australis.*
Slender, 4–10 in. Leaves $\frac{1}{8}$–$\frac{1}{4}$ in. broad. Flower small, $\frac{1}{4}$–$\frac{3}{4}$ in. long; sepals and petals with short subulate points.. .. 3. *P. graminea.*

** Radical leaves broad, oblong to ovate or orbicular, few or numerous and rosulate. Cauline leaves narrow, often reduced to sheathing bracts.

Slender, 4–12 in. Lower leaves $\frac{1}{2}$–$1\frac{1}{2}$ in., oblong; cauline 2–5, lanceolate, flat. Flower $\frac{3}{4}$–$1\frac{1}{2}$ in., galea not decurved .. 4. *P. micromega.*
Slender, 4–6 in. Cauline leaves 2–3, $1\frac{1}{2}$–2 in. long, oblong-lanceolate, flat, finely reticulate. Flower $1\frac{1}{4}$–$1\frac{1}{2}$ in. long, galea not decurved .. .. 5. *P. areolata.*
Stout or slender, 6–12 in. Lower leaves large, $1\frac{1}{2}$–$3\frac{1}{2}$ in., broadly ovate; cauline of 2–4 sheathing bracts. Flowers $\frac{1}{3}$–$\frac{1}{2}$ in. .. 11. *P. puberula.*

additional PTEROSTYLIS.

P. confertifolia, Allan.

Distribution: North Is. Ruahine range.

see T.N.Z.I. Vol. 56 p. 33. (Cockayne & Allan)

B. Catochilus. *Lower lip reflexed. Basal appendage of lip entire, obtuse.*

Leaves ovate-lanceolate. Flower solitary, large, $\frac{3}{4}$–1 in. long. Lip filiform, clothed with golden-yellow hairs .. .. 12. *P. barbata.*
Leaves ovate. Flowers 2–8, small, $\frac{1}{4}$ in. long; lip oblong, obtuse, glabrous .. .. 13. *P. mutica.*

1. **P. Banksii** *R. Br. ex. A. Cunn. in Bot. Mag.* (1832) t. 3172.—Tall, slender, leafy, grassy, 6–18 in. high. Lower leaves reduced to scarious sheathing scales; cauline numerous, sheathing the whole stem, usually overtopping

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See Hatch, T.R.S. N.Z. 77: 234-246 [illegible]
revision.

" Pleuth Orch. N.S.W.

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* No broad radical leaves. Cauline leaves linear, grass-like, sheathing the whole stem.

Tall, 6–18 in. Leaves $\frac{1}{4}$–$\frac{1}{2}$ in. broad. Flower large, 2–3 in. long; sepals and petals produced into long filiform points.. .. 1. *P. Banksii.*

Short, stout, 4–10 in. Leaves $\frac{1}{2}$–$\frac{3}{4}$ in. broad. Flower small, $\frac{3}{4}$–$1\frac{1}{4}$ in. long; sepals and petals with short subulate points.. 2. *P. australis.*

Slender, 4–10 in. Leaves $\frac{1}{8}$–$\frac{1}{4}$ in. broad. Flower small, $\frac{1}{4}$–$\frac{3}{4}$ in. long; sepals and petals with short subulate points.. .. 3. *P. graminea.*

** Radical leaves broad, oblong to ovate or orbicular, few or numerous and rosulate. Cauline leaves narrow, often reduced to sheathing bracts.

Slender, 4–12 in. Lower leaves $\frac{1}{2}$–$1\frac{1}{2}$ in., oblong; cauline 2–5, lanceolate, flat. Flower $\frac{3}{4}$–$1\frac{1}{2}$ in., galea not decurved .. 4. *P. micromega.*

Slender, 4–6 in. Cauline leaves 2–3, $1\frac{1}{2}$–2 in. long, oblong-lanceolate, flat, finely reticulate. Flower $1\frac{1}{4}$–$1\frac{1}{2}$ in. long, galea not decurved .. .. 5. *P. areolata.*

Stout or slender, 6–12 in. Lower leaves large, $1\frac{1}{2}$–$3\frac{1}{2}$ in., broadly oblong; cauline few, large, flat. Flower 1–$1\frac{1}{2}$ in., galea much decurved at the tip. .. .. 6. *P. Oliveri.*

Short, stout, 3–6 in. Lower leaves numerous, rosulate, $\frac{3}{4}$–$1\frac{3}{4}$ in. long. Cauline leaves 2–3, sheathing. Flowers large, $\frac{3}{4}$–1 in., strongly decurved from the base .. .. 7. *P. Matthewsii.*

Stout, glabrous or glandular-pubescent, 2–8 in. Lower leaves subrosulate, 1–$1\frac{3}{4}$ in., elliptic-oblong; cauline of 1–2 sheathing bracts. Flowers $\frac{3}{4}$ in.; galea arched but not decurved .. 8. *P. foliata.*

Small, 2–3 in. Lower leaves 2–3, large, $\frac{3}{4}$–2 in., broadly oblong, cauline wanting. Flower $\frac{1}{2}$–$\frac{3}{4}$ in. .. .. 9. *P. venosa.*

Slender, glabrous, 2–8 in. Lower leaves long-petioled; blade $\frac{1}{4}$–$\frac{1}{3}$ in., ovate; cauline narrow, flat. Flower $\frac{1}{2}$–1 in. .. 10. *P. trullifolia.*

Puberulous, 2–6 in. Lower leaves short-petioled; blade small, ovate; cauline of 2–4 sheathing bracts. Flowers $\frac{1}{3}$–$\frac{1}{2}$ in. .. 11. *P. puberula.*

B. Catochilus. *Lower lip reflexed. Basal appendage of lip entire, obtuse.*

Leaves ovate-lanceolate. Flower solitary, large, $\frac{3}{4}$–1 in. long. Lip filiform, clothed with golden-yellow hairs .. .. 12. *P. barbata.*

Leaves ovate. Flowers 2–8, small, $\frac{1}{4}$ in. long; lip oblong, obtuse, glabrous .. .. 13. *P. mutica.*

1. **P. Banksii** *R. Br. ex. A. Cunn. in Bot. Mag.* (1832) t. 3172.—Tall, slender, leafy, grassy, 6–18 in. high. Lower leaves reduced to scarious sheathing scales; cauline numerous, sheathing the whole stem, usually overtopping

P. conjestiglia allan 56: 32 = P. humilis Rogers T.R.S.S. Aust. 1922 See Hatch TNZI 75: 369.

the flower but often shorter than it, 3–14 in. long, $\frac{1}{4}$–$\frac{1}{2}$ in. broad, narrow linear-lanceolate, acuminate, pale-green. Flower solitary, large, 2–3 in. long including the tails to the lateral sepals, green, often streaked with red or reddish-brown. Galea erect at the base and then curved forwards; upper sepal produced into a long caudate often filiform point; petals also caudate-acuminate or shortly filiform, but always much shorter than the upper sepal. Lower lip with the entire part broadly cuneate, the free lobes gradually narrowed into long filiform erect tails 1–2 in. long. Lip narrow linear-oblong, obtuse, its tip slightly exserted; basal appendage curved, repeatedly divided and penicillate at the tip. Column slender, more than $\frac{1}{2}$ the length of the galea, upper lobe of wings with an erect subulate tooth at the outer angle; lower lobe narrow-oblong, obtuse.—*A. Cunn. Precur.* (1836) n. 313; *Raoul Choix* (1846) 41; *Hook. f. Fl. Nov. Zel.* i (1853) 248; *Handb. N.Z. Fl.* (1864) 268; *Cheesem. Man. N.Z. Fl.* (1906) 679; *Ill. N.Z. Fl.* ii (1914) t. 195. P. emarginata *Col. in Trans. N.Z. Inst.* xv (1883) 328. P. patens *Col. l.c.* xviii (1886) 270. P. speciosa *Col. l.c.* xxii (1890) 488. P. auriculata *Col. l.c.* xxii (1890) 489. P. subsimilis *Col. l.c.* xxviii (1896) 611.

North and South Islands, Stewart Island, Chatham Islands: Abundant in shaded places from the North Cape southwards. Sea-level to 4000 ft. October–November.

The most widely spread of the New Zealand species. It varies much in size and degree of robustness, the size of the flower, and in the length of the filiform tails to the sepals and petals, &c. Mr. Colenso has made no less than 5 species based upon what appear to me to be exceedingly slight and inconstant differences. After a careful study of his descriptions and specimens I must confess my inability to distinguish any of them, even as varieties.

2. **P. australis** *Hook. f. Fl. Nov. Zel.* i (1853) 248.—Habit of *P. Banksii* but shorter, 4–10 in. high, rarely more. Leaves shorter and broader, seldom overtopping the flower, $\frac{1}{2}$–$\frac{3}{4}$ in. broad, linear-lanceolate, acute or acuminate. Flower small, $\frac{3}{4}$–$1\frac{1}{4}$ in. long including the points of the sepals. Galea much as in *P. Banksii*, but the upper sepal and petals are not produced into filiform points. Lower lip with the free lobes narrowed into short subulate erect points not exceeding the galea in length. Lip and column as in *P. Banksii.*—*Handb. N.Z. Fl.* (1864) 268; *Cheesem. Man. N.Z. Fl.* (1906) 679.

North and South Islands: In various localities from the Ruahine Mountains to the south of Otago, but not common. Stewart Island, Chatham Islands: Abundant, *Lyall, T. Kirk! Cockayne, H. H. Travers, F. A. D. Cox!* &c. November–January.

No doubt very closely allied to *P. Banksii*, and to some extent connected with it by intermediate forms. But if it be merged with that species, then for the sake of consistency *P. graminea* should also be included, for it occupies just the same position on one side of *P. Banksii* that *P. australis* does on the other. It seems preferable to treat both as distinct though closely related species.

3. **P. graminea** *Hook. f. Fl. Nov. Zel.* i (1853) 248.—Habit of *P. Banksii*, but smaller and much more slender, 4–10 in. high. Leaves overtopping the flower or shorter than it, 1–5 in. long, $\frac{1}{8}$–$\frac{1}{4}$ in. broad, narrow-linear or narrow linear-lanceolate, acute or acuminate. Flower small, $\frac{1}{2}$–$\frac{3}{4}$ in. long including the points of the sepals. Galea as in *P. Banksii*, but the upper sepal and petals, although acuminate, are not produced into filiform points or into very short ones. Lower lip with the free lobes narrowed into

subulate or shortly filiform erect points almost equalling the galea. Lip and column as in *P. Banksii.*—*Handb. N.Z. Fl.* (1864) 268; *Cheesem. Man. N.Z. Fl.* (1906) 680.

Var. **rubricaulis** *H. B. Matthews* MS. *n. var.*—Very close to the type, but stems red, leaves usually 3 only, seldom 4. Flowers larger and broader, sometimes 1¼ in. long. Lateral sepals considerably longer.

North and South Islands, Stewart Island: Not uncommon in shaded places in lowland districts from the North Cape southwards. September–November.

Differs from *P. Banksii* in the smaller size, narrower leaves, and smaller flower with very short tails to the sepals.

4. **P. micromega** *Hook. f. Fl. Nov. Zel.* i (1853) 248.—Slender, glabrous, 4–12 in. high. Lower leaves ½–1½ in. long, ¼–½ in. broad, ovate-oblong to linear-oblong or lanceolate, obtuse or acute, sessile or petiolate; cauline 2–5, smaller and narrower, sessile, flat, sheathing at the base, acute or acuminate. Flower large, solitary, erect, ¾–1½ in. long. Galea erect at the base, then incurved, tip horizontal or nearly so; upper sepal narrow, acuminate; petals slightly shorter, broad, falcate, acuminate. Lower lip with the entire part cuneate, the free lobes very gradually narrowed into long filiform points embracing the galea, often quite 1 in. long. Lip narrow-linear, its tip exserted; basal appendage curved, penicillate. Column about ½ as long as the galea, upper lobe of wing with an erect subulate tooth, lower lobe oblong, obtuse.—*Handb. N.Z. Fl.* (1864) 268; *Cheesem. Man. N.Z. Fl.* (1906) 680. P. polyphylla *Col. in Trans. N.Z. Inst.* xxii (1890) 489.

North Island: Auckland—Swamps near Lake Tongonge, near Kaitaia, *R. H. Matthews!* Coromandel Harbour, *Joliffe* (Handbook); Paeroa Range, near Waiotapu, *K. W. Allison!* Taranaki—Ngaire Swamp, *T. F. C.* Wellington—Swamps near Tongariro, *H. Hill!* Murimotu, *Petrie!* swamps at Wairarapa, *Colenso!* Karioi, *A. Hamilton!* Sea-level to 3000 ft. December–January.

Best known by the slender habit, usually few radical leaves, numerous rather small flat cauline leaves, and large flower projecting outwards but not decurved at the tip.

5. **P. areolata** *Petrie in Trans. N.Z. Inst.* l (1918) 210.—Slender, glabrous, 4–6 in. high. Lower leaves not seen. Cauline leaves 2–3, 1½–2 in. long, ⅓–½ in. broad, oblong-lanceolate or elliptic-lanceolate, acute or subacute, thin, flat, sheathing at the base, finely reticulately veined. Flower rather large, solitary, erect, 1¼–1½ in. long, green streaked with reddish-brown. Galea erect at the base for more than ½ its length, then suddenly curved forwards; upper sepal terminating in a rather long but not filiform tip. Lower lip with the entire portion obcuneate, the free lobes gradually narrowed into long wide-spreading filiform points almost reaching the top of the galea. Column more than ½ as long as the galea. Lip narrow-linear, its tip exserted.

South Island: Marlborough—Base of Shingle Peak, Awatere Valley, alt. 3000 ft., *Cockayne!* Canterbury—Waimakariri Valley, at Bealey, 2500 ft., *T. Kirk!*

This is a somewhat critical species, which can hardly be considered as well established until more material has been obtained. Only 2 flowering specimens have been seen.

6. **P. Oliveri** *Petrie in Trans. N.Z. Inst.* xxvi (1894) 270.—Stout or slender, leafy, glabrous, 6–12 in. high. Lower leaves few, large, 1½–3½ in. long, ¾–1 in. broad, oblong-ovate or elliptic-oblong to oblong-lanceolate,

acute, narrowed into a short broad petiole or almost sessile, thin and membranous, veins reticulated; cauline leaves 2 or 3, almost as long but narrower, lanceolate or oblong-lanceolate, acute or acuminate, flat, spreading, sheathing at the base. Flowers large, solitary or very rarely 2, 1–1½ in. long. Galea bent forwards so that the point often reaches the ovary; upper sepal produced into a long acuminate point; petals much shorter, falcate, acuminate. Lower lip with the entire part broadly cuneate, the free lobes gradually narrowed into long filiform points embracing the galea and sometimes 1½ in. long. Lip narrow-linear, obtuse; basal appendage short, curved, penicillate. Column slender, not ½ the length of the galea; wings with a short upper lobe bearing an erect subulate tooth at the outer angle, lower lobe very long, linear-oblong, obtuse.—*Cheesem. Man. N.Z. Fl.* (1906) 680.

South Island: Nelson—Mount Arthur Plateau, *T. F. C.* Canterbury—Bealey, *T. Kirk!* Waimakariri Glacier, *T. F. C.* Westland—Kelly's Creek, *Petrie!* Otira Gorge, *Cockayne, T. F. C.* 1000–4000 ft. December–January.

Very close to *P. micromega*, but stouter, with much larger radical and cauline leaves, and with the flower very conspicuously decurved.

7. **P. Matthewsii** *Cheesem. in Trans. N.Z. Inst.* xlvii (1915) 46.—Stout, glabrous or sparingly puberulous, 3–5 in. high. Lower leaves 6–8, rosulate at the base of the stem, petiolate, ¾–1¾ in. long, oblong or oblong-ovate, acute or subacute, truncate or almost subcordate at the base, thin and membranous; venation conspicuous, consisting of 2 or 3 parallel longitudinal veins on each side of the midrib, connected by numerous transverse veinlets. Cauline leaves or bracts usually 2, erect and sheathing the greater part of the stem above the leaves, ¾–1¼ in. long, lanceolate or oblong-lanceolate, acute. Flowers solitary, large for the size of the plant, ¾–1 in. long, ½ in. broad, strongly curved outwards and downwards from the base, so that the tip becomes almost horizontal and points to the stem below the ovary. Upper sepal acute or acuminate; petals almost equal in length, falcate, lanceolate, acuminate. Lateral sepals (lower lip) connate to the middle, the free portions gradually narrowed into short filiform points embracing the galea. Lip narrow-ligulate, flat, obtuse; basal appendage short, penicillate at the tip. Column slender; auricles with an acuminate tooth at the tip.

North Island: Mongonui County, crest of ridge leading to Pukemiro Hill, near Kaitaia, *H. B. Matthews!*

No doubt nearly related to *P. foliata*, but easily separated by the more numerous rosulate radical leaves, which are obviously petiolate and truncate or even subcordate at the base, and by the strongly deflexed flowers. The flowers of *P. foliata* are always erect at the base, and although the upper part curves forward it never becomes deflexed to anything like the extent of *P. Matthewsii*. I have had much pleasure in dedicating the plant to its zealous discoverer, who, with his father, the late Mr. R. H. Matthews, has done excellent work in investigating the orchid flora of the extreme northernmost portions of the Dominion.

8. **P. foliata** *Hook. f. Fl. Nov. Zel.* i (1853) 249.—Rather stout, very variable in size, 3–18 in. high; upper part of peduncle, ovary, and occasionally the lateral sepals more or less finely glandular pubescent. Lower leaves 2–5, subrosulate, sessile or shortly petiolate, 1–1¾ in. long, elliptic-oblong to linear-oblong, obtuse or subacute, rather fleshy when fresh, veins conspicuously reticulated when dried; cauline leaves reduced to 1 or 2 large sheathing erect lanceolate bracts ½–1 in. long. Flower solitary, erect, ¾ in.

long. Galea erect at the base, curved forwards at the tip; upper sepal acute or acuminate; petals falcate, obtuse or subacute. Lower lip with the entire part short, broadly cuneate, the free lobes gradually narrowed into short filiform points embracing the galea but not much exceeding it. Lip linear-oblong, flat, obtuse; basal appendage short, curved, penicillate at the tip. Column not $\frac{1}{2}$ the length of the galea, upper lobe of wing with a subulate tooth; lower lobe oblong, obtuse.—*Handb. N.Z. Fl.* (1864) 268; *Cheesem. Man. N.Z. Fl.* (1906) 681; *Ill. N.Z. Fl.* ii (1914) t. 196.

North Island: Hawke's Bay—Lake Tutira, *H. Guthrie-Smith!* Wellington—Ruahine Mountains and Cape Palliser, *Colenso!* Patangata, *Tryon!* Tararua Mountains, *B. C. Aston!* South Island: Marlborough—*T. Kirk!* Canterbury—Ashburton, *H. H. Allan!* Otago—*Buchanan!* Signal Hill, Millburn, Tuapeka, *Petrie!* Sea-level to 2500 ft., usually in *Sphagnum* bogs. December–January.

Differs from *P. micromega* in the stouter habit, larger more reticulate and often decidedly rosulate radical leaves, cauline leaves reduced to sheathing bracts, smaller flowers with shorter points to the lateral sepals, and broader shorter lip. *P. Oliveri* is separated by the same characters, and by the much larger conspicuously decurved flower. According to Dr. Schlechter, *P. foliata* is closely allied to the New Caledonian *P. Bureauviana*, a species with which I am not acquainted.

9. **P. venosa** *Col. in Trans. N.Z. Inst.* xxviii (1896) 610.—Small, perfectly glabrous, 2–3 in. high. Leaves 2 or 3 near the base of the stem, large for the size of the plant, $\frac{3}{4}$–2 in. long, broadly oblong to oblong-ovate or elliptic-oblong, obtuse or subacute, thin and membranous, veins conspicuously reticulated; cauline leaves wanting. Scape short; flower solitary, $\frac{1}{2}$–$\frac{3}{4}$ in. long. Galea erect at the base, sharply curved forwards towards the tip; upper sepal acute or acuminate; petals broadly falcate, acute. Lower lip broadly cuneate, the free lobes narrowed into filiform points exceeding the galea, sometimes recurved at the tips. Lip lanceolate, narrowed to a blunt point, rather thick, grooved, purplish; basal appendage penicillate at the tip. Column barely $\frac{1}{2}$ as long as the galea, upper lobe of wing with an erect subulate point; lower lobe oblong, obtuse.—*Cheesem. Man. N.Z. Fl.* (1906) 681. (?) P. trifolia *Col. l.c.* xxxi (1899) 281.

North Island: Ruahine Mountains, *Olsen!* Mount Holdsworth, Tararua Range, *W. Townson!* South Island: Marlborough—Endeavour Inlet, alt. 3000 ft., *J. H. Macmahon!* Nelson—Mount Frederic, near Westport, *W. Townson!*

This appears to be separated from *P. foliata* by the smaller size and proportionately larger leaves, the short scape, which wants the large sheathing bracts of *P. foliata*, and by the more sharply curved and more acute galea. Although I do not doubt its distinctness as a species, the amount of material examined is small, and much of it is in poor condition. A fresh description of the flower, based on living specimens, is much wanted.

10. **P. trullifolia** *Hook. f. Fl. Nov. Zel.* i (1853) 249.—Stem slender, glabrous, 2–6 in. high, seldom more. Radical leaves often wanting in flowering specimens or 1–4, in flowerless ones more numerous and subrosulate, petiolate; blade $\frac{1}{4}$–$\frac{1}{3}$ in. long, broadly ovate or orbicular-cordate or trowel-shaped, acute or obtuse; petiole as long or longer than the blade. Cauline leaves or bracts 3–5, flat, spreading, $\frac{1}{3}$–1 in. long, lanceolate or linear-lanceolate, acute or acuminate, the lower sometimes broader and petiolate. Flower solitary, $\frac{1}{2}$–1 in. long. Galea erect at the base and then gradually curved forwards; upper sepal lanceolate, acuminate; petals as broad, falcate, acuminate. Lower lip broadly cuneate, the lobes long and filiform, embracing the upper sepal and exceeding it. Lip linear, glabrous, obtuse, its tip exserted; basal appendage linear, much curved, penicillate

at the tip. Column less than ½ the length of the galea; wings with a small triangular upper lobe or tooth; lower lobe oblong, obtuse.—*Handb. N.Z. Fl.* (1864) 269; *Cheesem. Man. N.Z. Fl.* (1906) 682; *Ill. N.Z. Fl.* ii (1914) t. 194B. P. rubella *Col. in Trans. N.Z. Inst.* xviii (1886) 271.

Var. **gracilis** *Cheesem. in Trans. N.Z. Inst.* xlvii (1914) 46.—Taller and more slender than the type, sometimes 10 in. high. Radical leaves usually wanting in flowering specimens, and seldom more than 1 or 2 in barren plants. Cauline leaves narrower. Flowers smaller, ½–⅔ in. long; lateral sepals shorter in proportion.—*Ill. N.Z Fl. l.c.* t. 194B, *flgt-hand figure.*

North Island: Lowland districts from the North Cape to Wellington, apparently rare and local to the south of the East Cape. South Island: Marlborough—Mount Peter, *J. H. Macmahon!* Sea-level to 1500 ft. Var. *gracilis* probably has the range of the type; but I have not seen specimens from the south of the Waikato River.

11. **P. puberula** *Hook. f. Fl. Nov. Zel.* i (1853) 249.—Stem slender, puberulous, especially below, 2–4 in. high. Leaves all radical, crowded in a rosette at the base of the stem, small, shortly petiolate, ⅕–½ in. including the petiole, ovate or ovate-cordate, acute; bracts on the stem above the leaves 2–4, sheathing, erect, lanceolate, acuminate. Flower solitary, erect, ½ in. long. Galea erect, shortly and abruptly incurved towards the tip, the upper sepal acute, the petals as long or rather longer, obtuse. Lateral sepals united for nearly ½ their length into a narrow almost quadrangular lamina, the lobes filiform, erect, separated by a broad truncate sinus which bears a small inflexed tooth in the middle. Lip linear-oblong, obtuse, its tip barely exserted; basal appendage linear, curved, penicillate at the tip. Column about ½ the length of the galea, the wings with a small erect triangular upper lobe or tooth, the lower lobe linear-oblong, obtuse.—*Handb. N.Z. Fl.* (1864) 269; *Cheesem. Man. N.Z. Fl.* (1906) 682.

North Island: Auckland—Clay hills from the Kaipara Harbour southwards to the Thames and Middle Waikato, not common. South Island: Nelson—Vicinity of Westport, *W. Townson!* September–October.

A distinct little plant, well marked by the puberulous stems, small rosulate leaves, the short blunt curved tip to the galea, and comparatively short filiform points to the lateral sepals.

12. **P. barbata** *Lindl. Bot. Regist.* xxv (1839) App. 53.—Stem stout or slender, glabrous, 4–8 in. high. Leaves radical, crowded at the base of the stem, often rosulate, erect, sessile, ¼–¾ in. long, ovate-lanceolate or lanceolate, acute or acuminate. Stem above the leaves with 2–5 large loosely sheathing erect empty bracts. Flower solitary, ¾–1 in. long. Galea erect, incurved at the tip, oblong; upper sepal and petals both produced into short subulate points, the latter very narrow. Lower lip linear, deflexed, 2-lobed about half-way down, the lobes very narrow, acute or obtuse. Lip ½–¾ in. long, filiform, terete, exserted, pendulous, fringed with long golden yellow hairs and terminated by a large capitate or irregularly lobed purple gland; appendix very short, curved, penicillate at the tip. Column slender, erect; the wings each with a long erect subulate tooth on the front angle, the lower lobe narrow, ciliate.—*Benth. Fl. Austral.* vi (1873) 362; *Cheesem. Man. N.Z. Fl.* (1906) 683. P. squamata *Hook. f. Fl. Nov. Zel.* i (1853) 249; *Fl. Tasm.* ii (1860) 20, t. 116; *Handb. N.Z. Fl.* (1864) 269 (*not of R. Br.*).

North Island: Auckland—Exact locality not stated, *Sinclair!* near Kaitaia, *R. H. Matthews!* Cowes, Waiheke Island, *J. H. Harvey!* Lower Thames Valley, from Kopu and Puriri to Kerikeri, *Adams! T. F. C.;* between Mercer and Miranda,

T. F. C.; Tirau and other places in the Upper Thames Valley, *T. F. C.*; Kaitoke, Tararua Mountains, *B. C. Aston!* Day's Bay, Wellington Harbour, *E. H. Atkinson!* Sea-level to 1000 ft. October–November.

A very remarkable little plant, at once recognized by the filiform exserted lip plumose with bright-yellow hairs. It is a common Tasmanian plant, and is also found in South Australia, Victoria, and New South Wales.

13. **P. mutica** *R. Br. Prodr.* (1810) 328.—Rather stout, 2–5 in. high. Leaves radical, forming a rosette at the base of the stem, sometimes withering at the flowering season, shortly petiolate, $\frac{1}{3}$–$\frac{3}{4}$ in. long, ovate, acute, veins reticulated. Stem with 2–5 large sheathing bracts above the leaves. Raceme 2–8-flowered; flowers small, about $\frac{1}{4}$ in. long, greenish-brown. Galea very broad, much incurved, obtuse or subacute at the tip. Lower lip small, reflexed, concave, nearly orbicular when spread out, 2-lobed almost to the middle. Lip on a very short flat claw, lamina broadly oblong, obtuse; appendage broad at the base, short and thick, entire, rounded or emarginate at the tip. Column erect; wings broad, the lower lobe or auricle broad, obtuse.—*Hook. f. Fl. Tasm.* ii (1860) 21, t. 117A; *Benth. Fl. Austral.* vi (1873) 362; *Fitzgerald Austral. Orch.* i (1877) pt. 2; *Cheesem. in Trans. N.Z. Inst.* xv (1883) 300; *Man. N.Z. Fl.* (1906) 683. P. tristis *Col. in Trans. N.Z. Inst.* xviii (1886) 271.

North Island: Hawke's Bay—Waipawa River, *H. Hill!* South Island: Canterbury—Lake Lyndon and Lake Grassmere, *J. D. Enys!* Lake Heron, *Cockayne;* Ashburton, *H. H. Allan!* Cass River, *Cockayne* and *Foweraker;* Mount Arrowsmith, *Cockayne* and *R. M. Laing.* Otago—Lee Stream, *Sydney Fulton!* Horse Range, Naseby, St. Bathan's, Cambrian's, *Petrie!* Sea-level to 2500 ft. November–January.

An abundant Australian plant, ranging from Queensland to Tasmania.

12. **ACIANTHUS** R. Br.

Small tender terrestrial herbs. Root of rounded tubers at the end of long fleshy fibres. Leaf solitary, sessile, cordate. Flowers few or many in a raceme, rarely solitary; bracts usually small. Upper sepal erect or curved over the column, concave, rather narrow, acute or acuminate; lateral sepals narrower, often almost filiform, erect or spreading. Petals shorter than the sepals, subulate-lanceolate. Lip equalling the petals, sessile or nearly so, undivided, base with 2 adnate calli, disc smooth or papillose. Column elongated, erect or incurved, semiterete or winged; stigma cup-shaped, placed under the rostellum. Anther terminal, erect, 2-celled; pollinia 2 or 4 in each cell, granular.

A genus comprising 7 species: 4 in Australia, 2 in New Caledonia, and 1 in New Zealand.

See Hooker 7:5: 269.

1. **A. Sinclairii** *Hook. f. Fl. Nov. Zel.* i (1853) 245.—Stems slender, sometimes almost filiform, 1–6 in. high. Leaf near the base or almost half-way up the stem, sessile, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, broadly ovate-cordate, acute or acuminate, deeply bilobed at the base, membranous, often purple beneath, veins reticulated. Flowers 2–12, shortly pedicelled, $\frac{1}{4}$ in. diam., green; bracts ovate, acute, the lowest sometimes foliaceous. Upper sepal ovate-oblong, aristate, 3-nerved; lateral sepals and petals subulate-lanceolate, acuminate. Lip horizontal or deflexed, ovate-lanceolate, concave, base with 2 large calli, tip thickened and studded with minute fleshy

papillae. Column arched over the lip, much thickened and expanded towards the tip. Pollinia 2 in each anther-cell, deeply bilobed.—*Handb. N.Z. Fl.* (1864) 264; *Cheesem. Man. N.Z. Fl.* (1906) 684.

KERMADEC ISLANDS, NORTH ISLAND: Abundant in lowland districts throughout. SOUTH ISLAND: Marlborough—Pelorus Sound, *J. H. Macmahon!* Nelson—Dun Mountain, *T. Kirk!* near Westport, *W. Townson!* CHATHAM ISLANDS: Abundant, *F. A. D. Cox! Miss Seddon!* Sea-level to 2500 ft. May–August.

For an account of the fertilization, see a paper by myself in Trans. N.Z. Inst. vii (1875) 349.

13. **CYRTOSTYLIS** R. Br.

Small delicate terrestrial herbs. Root of rounded tubers on long fleshy fibres. Leaf solitary, sessile, oblong to orbicular. Flowers few in a terminal raceme, often reduced to one; bracts small. Upper sepal linear or linear-lanceolate, erect or incurved, concave; lateral sepals and petals narrow-linear, spreading or deflexed. Lip horizontally spreading from the base of the column, undivided, oblong, flat, entire; base with 2 calli, produced into raised lines for some distance along the lamina. Column elongated, incurved, winged on each side towards the summit; stigma cup-shaped, placed just under the rostellum. Anther terminal, erect, 2-celled; pollinia 2 in each cell, falcate or lobed.

A genus of 2 closely allied species, one found in New Zealand, the other in Australia.

1. **C. oblonga** *Hook. f. Fl. Nov. Zel.* i (1853) 246.—Stems very slender, glabrous, 1–4 in. high. Leaf towards the base of the stem, sessile, spreading, ½–1½ in. long, oblong or oblong-ovate, obtuse or subacute, cordate or rounded at the base, thin and membranous, flat, obscurely 3–5-nerved. Flowers solitary or in a 2–5-flowered raceme, greenish, ⅓ in. diam.; bracts small, ovate-lanceolate. Upper sepal narrow linear-obovate, erect; lateral sepals and petals narrow-linear, acute, spreading or deflexed. Lip as long as the sepals, linear-oblong, obtuse. Column slender, about ⅔ the length of the upper sepal. Pollinia 2 in each anther-cell, oblong-falcate.—*Handb. N.Z. Fl.* (1864) 264; *Cheesem. Man. N.Z. Fl.* (1906) 685.

Var. **rotundifolia.**—Altogether like the type, but the leaf is orbicular-cordate, ½–1½ in. diam.—C. rotundifolia *Hook. f. Fl. Nov. Zel.* i (1853) 246; *Handb. N.Z. Fl.* (1864) 264. C. macrophylla *Hook. f. Fl. Nov. Zel.* i (1853) 246.

NORTH ISLAND: Not uncommon from the North Cape southwards. SOUTH ISLAND: Marlborough—Pelorus Sound, *J. Rutland, J. H. Macmahon!* Nelson—Buller Valley, *T. F. C.* Canterbury—Banks Peninsula, *J. B. Armstrong;* Broken River, *J. D. Enys! T. F. C.* Sea-level to 2500 ft. August–October.

I have been compelled to sink *C. rotundifolia* as a species. It differs in no respect except in the width of the leaf, and in several localities I have observed the two forms growing intermixed and gradually passing into each other.

14. **CALOCHILUS** R. Br.

Glabrous terrestrial herbs. Root of oblong tubers. Leaves 1 or rarely 2 near the base of the stem, narrow-linear; usually there are 1 or 2 foliaceous sheathing bracts higher up. Flowers few in a terminal raceme, rather large, handsome; pedicels short; lower bract usually exceeding the ovary. Sepals almost equal, free; upper erect, broad, concave; lateral spreading. Petals smaller, broadly falcate. Lip as long or longer than the sepals, sessile, spreading or pendulous, undivided, the margins and whole surface

except the narrow flexuous tip densely fringed with long hairs. Column short, broadly winged; stigma broad, placed under the erect rostellum. Anther large, terminal, erect or incumbent, obtuse or pointed, 2-celled; pollinia granular.

A genus of 3 very closely related species, all natives of Australia, 2 of them extending to New Zealand as well.

Anther long, rostrate. Column-wing with a gland on each side near the base just within the front margin .. .. 1. *C. campestris.*
Anther short, obtuse. Column-wing without any gland, but 2 small erect lamellae on each side of the base of the lip .. 2. *C. paludosus.*

1. **C. campestris** *R. Br. Prodr.* (1810) 320.—Stem stout, 6–18 in. high. Leaf usually solitary, rarely 2, much shorter than the stem, narrow-linear, thick, channelled; cauline leaves or bracts 1 or 2, sheathing. Flowers 2–8, greenish-purple; pedicels ½–1 in. long; bracts acuminate. Upper sepal ⅓–½ in. long, broadly ovate, acute, concave; lateral narrower. Petals shorter, broadly oblong, falcate, veined. Lip ½–¾ in. long; margins and upper surface except the slender flexuous tip covered with long reddish-purple hairs or fimbriae, which are longest on the upper part of the lip, and shortest near the base, where they are reduced to clavate calli; usually there is a narrow strip across the very base of the lip which is smooth and bare. Column-wings dilated in front and produced into a rounded lobe on each side, on the inner face of which is a conspicuous gland. Anther long, triangular, rostrate.—*Benth. Fl. Austral.* vi (1873) 315; *Fitzgerald Austral. Orch.* i (1877) pt. 4; *T. Kirk in Trans. N.Z. Inst.* xxiv (1892) 427; *Cheesem. Man. N.Z. Fl.* (1906) 686.

North Island: Auckland—Rotorua, *Spencer! Petrie!* Paeroa Range, near Waiotapu, *K. W. Allison!* November–December.

This doubtless has as wide a range as the following species, but so far I have seen no specimens except from Rotorua. These exactly match the plate in Fitzgerald's Australian Orchids, with the exception that the fimbriae on the lip never show any trace of blue, but are always red.

2. **C. paludosus** *R. Br. Prodr.* (1810) 320.—Very similar in habit and appearance to *C. campestris*, but usually (though not always) more slender, with a rather longer and narrower leaf. Flowers seldom more than 4. Sepals and petals much as in *C. campestris*. Lip longer, the surface and margins with long red fimbriae, the linear bare tip longer, and the base with a thin longitudinal raised plate on each side. Column-wing dilated in front and produced into a rounded lobe on each side, not furnished with a gland on the inner face. Anther short, as broad as long, obtuse, neither acuminate nor rostrate.—*Benth. Fl. Austral.* vi (1873) 316; *Fitzgerald Austral. Orch.* i (1877) pt. 4; *Buch. in Trans. N.Z. Inst.* xv (1883) 240; *Cheesem. Man. N.Z. Fl.* (1906) 686.

North Island: Auckland—Kaitaia, *R. H. Matthews!* Aponga (near Whangarei), *A. Thompson!* Rotorua, *Petrie!* South Island: Nelson—Vicinity of Collingwood, *H. H. Travers!* near Westport, *W. Townson!*

15. **LYPERANTHUS** R. Br.

Terrestrial herbs, often black when dry. Stems rather stout. Leaves 1–3, sheathing at the base, broad or narrow. Flowers in a terminal raceme or spike, sometimes solitary; bracts large, sheathing. Upper sepal erect, incurved, broad, concave; lateral narrow, spreading or deflexed. Petals

Pterostylis californica var. parcelata Rogers 1925 T.N.Z.I. 56:18.

similar to the lateral sepals. Lip shorter than the sepals, with a broad erect claw sometimes dilated into small lateral lobes; lamina or middle lobe ovate or lanceolate, entire; disc with ridges or small calli. Column erect or incurved, not winged; stigma placed under the rostellum. Anther terminal, erect, 2-celled; pollinia 4, narrow, subterete, granular.

A somewhat ill-defined genus of 6 species, 4 of which are found in Australia, 1 in New Caledonia, and the remaining 1 in New Zealand.

1. **L. antarcticus** *Hook. f. Fl. Antarct.* ii (1847) 544.—Stems rather stout, 3–8 in. high. Leaves 1–3, sheathing at the base, 1–2½ in. long, the upper smaller, lanceolate or oblong-lanceolate, acute, rather coriaceous; veins numerous, parallel. Flowers 1–3, greenish, horizontal or nearly so, ⅓–½ in. long; bracts large, cucullate, sheathing, ½–¾ in. long. Upper sepal large, broad, curved over the column, hooded, acute; lateral sepals and petals linear-subulate, acute. Lip with a very short claw; lamina ovate-oblong, obtuse or subacute, margins thick, disc with 5 or 6 slender longitudinal lamellae. Column short, stout, curved.—*Handb. N.Z. Fl.* (1864) 270; *Cheesem. Man. N.Z. Fl.* (1906) 687; *Ill. N.Z. Fl.* ii (1914) t. 197.

North Island: Tararua Mountains, *Petrie, B. C. Aston!* South Island: Subalpine localities from Collingwood and the Spenser Mountains southwards, but not common. Stewart Island: *T. Kirk!* Auckland Islands: *Le Guillou, Bolton, T. Kirk!* 2500 ft. to 4000 ft., descending to sea-level in Stewart Island and the Auckland Islands. December–February.

The upper sepal is much broader and more hooded than in any other species of the genus, the sepals and petals are less spreading, and the column shorter and broader.

16. **CALADENIA** R. Br.

Slender terrestrial herbs, usually more or less pilose or villous, rarely glabrous. Root of small rounded tubers terminating fleshy fibres. Leaf solitary from near the base of the stem, linear or lanceolate, more rarely broader and oblong-lanceolate or oblong. Flowers on an erect slender scape, solitary or in few-flowered racemes; bracts small. Upper sepal erect or incurved, narrow, concave; lateral flat, spreading, or rarely all alike and spreading. Petals narrow, erect or spreading. Lip clawed on to the base of the column, undivided or 3-lobed, the lateral lobes when present erect, the middle lobe spreading or reflexed, the margins often toothed or fimbriate, the disc usually studded with linear or clavate sessile or stipitate calli. Column rather long, erect or incurved, more or less 2-winged above; stigma broad, prominent. Anther erect, terminal, 2-celled; pollinia granular.

About 40 species are known, all confined to Australia, except 1 in Malaya, another in New Caledonia, and the 4 following, which are endemic in New Zealand.

Slender, 3–10 in. high. Leaf solitary, linear, $\frac{1}{15}$–$\frac{1}{8}$ in. broad. Petals and sepals linear, obtuse. Flower ¼–⅓ in. diam. Lip 3-lobed	1 *C. minor.*
Slender, 2–4 in. high. Leaf solitary, linear, $\frac{1}{20}$ in. broad. Flower ⅕ in. diam. Petals and sepals linear, acuminate. Lip 3-lobed	2. *C. exigua.*
Rather stout. Leaf solitary, linear, ⅛–¼ in. broad. Flower ½–1 in. diam. Lip 3-lobed	3. *C. Lyallii.*
Rather stout. Leaves 2, oblong or lanceolate. Flower ¾ in. diam. Lip undivided	4. *C. bifolia.*

1. **C. minor** *Hook. f. Fl. Nov. Zel.* i (1853) 247, t. 56B.—Stems very slender, 3–10 in. high, rarely more, glandular-pilose with spreading hairs. Leaf from near the base of the stem and always shorter than it, 1–8 in. long,

See Hatch T.R.S. N.Z. 1945: 368.

$\frac{1}{16}$–$\frac{1}{8}$ in. broad, very narrow-linear, flat, striate, ciliate or pilose. Flower solitary or rarely 2, pink, about $\frac{1}{3}$ in. diam. Sepals subequal, linear or linear-oblong, obtuse or subacute; upper sepal erect; lateral spreading or deflexed. Petals similar to the sepals, spreading. Lip shorter than the sepals, broad, 3-lobed; lateral lobes large, oblong, obtuse, erect, usually marked with transverse purplish bands; middle lobe lanceolate-deltoid, acuminate, reflexed, margins fringed with linear calli; disc with 2 continuous rows of bright-yellow stipitate calli. Column elongate, as long as the lip, incurved, broadly winged. Anther apiculate.—*Handb. N.Z. Fl.* (1864) 267; *Cheesem. Man. N.Z. Fl.* (1906) 688. C. variegata *Col. in Trans. N.Z. Inst.* xvii (1885) 248.

North and South Islands: From the North Cape to Otago, not uncommon. Sea-level to 2000 ft. September–December.

C. carnea var exigua (Cheesem.) Rupp. Proc. L.S.N.S. W. 69: 174

2. **C. exigua** *Cheesem. in Trans. N.Z. Inst.* xlv (1913) 96.—Closely allied to *C. minor*, but stems shorter and more slender and wiry, 2–5 in. high, sparingly glandular-pilose. Leaf solitary from the base of the stem, small, very narrow linear, $\frac{3}{4}$–$2\frac{1}{2}$ in. long, very sparingly pilose or almost glabrate. Flowers seldom more than one; sepals and petals subequal, all narrow-lanceolate and acuminate, upper sepal erect, the rest spreading or deflexed. Lip broad, 3-lobed; disc with two continuous rows of bright-yellow stipitate glands as in *C. minor;* intermediate lobe with only one marginal stipitate gland on each side; lateral lobes with transverse purplish bands. —C. minor *var.* exigua *Cheesem. Man. N.Z. Fl.* (1906) 688.

North Island: Auckland—*Leptospermum* scrub near Kaitaia, Mongonui County, *R. H. Matthews* and *H. B. Matthews!* Cowes, Waiheke Island, *J. H. Harvey!* September.

In the first edition of this work I treated this as a variety of *C. minor*, to which it is certainly closely allied. Since then Mr. H. B. Matthews has supplied me with an extensive series of fresh specimens, proving that the differences are constant and of more importance than I previously supposed. I now willingly accept it as a distinct species, differing from *C. minor* in its much smaller size and more slender habit; in the smaller flowers; in the sepals and petals being narrow-lanceolate and acuminate, instead of linear and obtuse as in *C. minor;* and in the middle lobe of the lip having only one stipitate gland on each side, whereas *C. minor* has several.

3. **C. Lyallii** *Hook. f. Fl. Nov. Zel.* i (1853) 247.—Rather stout, 4–12 in. high, pilose with long soft hairs. Leaf from near the base of the stem and much shorter than it, $\frac{1}{8}$–$\frac{1}{4}$ in. broad, narrow-linear, rather thick, channelled, sparingly pilose on the margins and under-surface. Scape stout, with a sheathing bract about the middle, 1–2-flowered. Flower large, $\frac{1}{2}$–1 in. diam. Upper sepal $\frac{1}{3}$–$\frac{1}{2}$ in. long, obovate-oblong, erect or incurved, concave; lateral elliptic-oblong. Petals similar to the lateral sepals. Lip about $\frac{1}{2}$ as long as the lateral sepals, 3-lobed; lateral lobes broad, jagged at the tip, often banded with purple; middle lobe small, recurved; disc with 4 rows of stipitate calli. Column rather long, broadly winged, incurved; anther shortly apiculate.—*Handb. N.Z. Fl.* (1864) 267; *Cheesem. Man. N.Z. Fl.* (1906) 688.

South Island, Stewart Island, Auckland Islands.—Not uncommon in subalpine localities. Usually from 2500 to 5000 ft., but descends to sea-level in the Auckland Islands. December–January.

A handsome little plant, much more robust than *C. minor*, and with much larger flowers.

Aporostylis bifolia (Hook.f.) Rupp & Hatch
P.h.s.N.S.W. 70: 60.
See also Hatch TN.Z1. 77: 226.

4. **C. bifolia** *Hook. f. Fl. Nov. Zel.* i (1853) 247.—Stout or slender, glandular-pubescent, 3–9 in. high. Leaves two together towards the base of the stem, spreading, 1–2½ in. long, variable in shape, one usually much broader than the other, ovate or oblong to ovate-lanceolate or lanceolate, acute, sparingly glandular-pubescent, margins ciliate. Scape 1-flowered, with a sheathing bract a little distance below the flower. Flower white with a tinge of pink, nearly 1 in. diam. when fully expanded. Upper sepal narrow-oblong, obtuse, erect, concave; lateral spreading, linear-lanceolate. Petals shorter and narrower. Lip sessile by a narrow base, spreading, orbicular-obovate, rounded at the tip, undivided, margin entire; disc with two almost continuous lines of yellow calli extending from the middle to the base. Column elongate, incurved, 2-winged, wings not produced behind the anther.—*Handb. N.Z. Fl.* (1864) 267; *Cheesem. Man. N.Z. Fl.* (1906) 689; *Ill. N.Z. Fl.* ii (1914) t. 197B. C. macrophylla *Col. in Trans. N.Z. Inst.* xxvii (1895) 396. Chiloglottis Traversii *F. Muell. Veg. Chath. Is.* (1864) 51.

North and South Islands, Stewart Island, Chatham Islands, Auckland Islands: Not uncommon in upland districts from Lake Taupo and Mount Egmont southwards. Ascends to 4500 ft., descends to sea-level in the extreme south and in the outlying islands. December–January.

A curious plant, the genus of which is doubtful. It was referred to *Chiloglottis* by Mueller, and certainly is allied to it in habit, but it wants the essential character of the wings of the column produced into 2 lobes behind the anther. On the whole I think it is best retained in *Caladenia.*

Hatch T.R.S.N.Z. 77: 228.

17. CHILOGLOTTIS R. Br. 1810 – 323.

Terrestrial herbs, with small underground tubers. Leaves 2, radical or nearly so, oblong or linear-oblong. Scape 1-flowered, with a solitary bract below the flower. Upper sepal erect, incurved, concave, narrowed at the base; lateral narrow-linear or terete, spreading or reflexed. Petals lanceolate, falcate. Lip attached to the base of the column by a short or long claw, ovate or obovate, undivided; disc with variously arranged calli. Column elongated, incurved, winged; wings produced at the top into 2 erect lobes often equalling the anther. Stigma placed just under the rostellum. Anther terminal, erect, 2-celled; pollinia 4, granular.

A small genus of 7 species, 6 of which are natives of Australia, one of them extending to New Zealand, the remaining one confined to New Zealand. The genus differs from *Caladenia* principally in the 2-leaved stem and in the wing of the column extending behind the anther. *Caladenia bifolia* has the habit of *Chiloglottis,* but the column-wing is that of *Caladenia,* in which genus I have retained it.

Stout, upper sepal broad ovate-lanceolate; lateral sepals and petals erect. Lip very shortly clawed, trowel-shaped .. .. 1. *C. cornuta.*
Slender. Upper sepal linear-spathulate. Petals deflexed. Lip with a very long narrow claw, lamina rhomboid .. .. 2. *C. formicifera.*

1. **C. cornuta** *Hook. f. Fl. Antarct.* i (1844) 69.—Usually rather stout, perfectly glabrous, 2–5 in. high. Leaves 2, close together, petiolate, spreading, 1–3 in. long, ½–1 in. broad, oblong or linear-oblong or oblong-lanceolate, acute or subacute, flat, rather fleshy when fresh; veins parallel, connected by transverse veinlets. Scape very short at first, but lengthening as the flower withers and sometimes 4–8 in. long in fruit, 1-flowered or very rarely 2-flowered; bract sheathing. Flower about ½ in. diam., green, sometimes spotted with purple. Upper sepal broadly ovate-lanceolate, acuminate, erect. Lateral sepals placed in front of the

lip, linear-lanceolate. Petals ovate-lanceolate, acuminate, erect. Lip triangular-cordate or trowel-shaped, acute, concave; disc with 3 large stalked rounded calli near the base, 2 linear ones on each side higher up, and 3 smaller rounded ones between them. Column curved forwards, winged; the wings expanded above and produced upwards into 2 lobes exceeding the anther.—*Handb. N.Z. Fl.* (1864) 269; *Cheesem. Man. N.Z. Fl.* (1906) 690; *Ill. N.Z. Fl.* ii (1914) t. 198A.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND, ANTIPODES ISLAND, AUCKLAND AND CAMPBELL ISLANDS: Moist shaded places from Kaitaia and Mangonui southwards, not common. Sea-level to 3000 ft. October–December.

As a rule, the calli on the labellum agree with the description given above; but occasionally the number is reduced to 6, and I have seen as many as 12. The flowers are sometimes nearly altogether purple.

2. **C. formicifera** *Fitzgerald Austral. Orch.* i (1877) pt. 3.—Slender, delicate, 2–3 in. high. Leaves 2, close together, sessile, spreading, 1–2 in. long, linear-oblong or oblong-lanceolate, obtuse, thin and membranous, margins often undulate when fresh; veins parallel, connected by transverse veinlets. Scape 2–3 in. high, 1-flowered; bract near the top, sheathing. Flower about ½ in. long. Upper sepal linear-spathulate, erect, acuminate; lateral about the same length, linear, acuminate. Petals linear-lanceolate, abruptly deflexed, about as long as the sepals. Lip horizontal or ascending, contracted below into a long and narrow claw, above suddenly expanded into a short and broad spoon-shaped or rhomboid lamina, the tip of which is usually reflexed; disc with numerous calli, the largest of which is placed at the base, and projects from it, with a kind of double head, towards the column; in front of this is a large flat heart-shaped gland, and rows of smaller calli reach the apex of the lip. Column arched forward, broadly winged.—*Cheesem. in Trans. N.Z. Inst.* xxxiii (1901) 312; *Man. N.Z. Fl.* (1906) 690.

NORTH ISLAND: Auckland—Kaitaia (Mongonui County), *R. H. Matthews!* September–October.

A very remarkable little plant, previously known only from eastern Australia. Mr. Matthews's specimens agree in all respects with Mr. Fitzgerald's beautiful plate. Very rare and local, and up to the present time very few specimens have been found.

18. **ADENOCHILUS** Hook. f.

Slender terrestrial herbs. Leaf solitary, placed near the middle of the stem, ovate. Peduncle slender, 1-flowered, with 1 or 2 sheathing bracts between the flower and the leaf, the upper of which sometimes bears in its axil the minute rudiment of a second flower. Flower small. Upper sepal erect, incurved, concave or almost galeate; lateral lanceolate, placed under the lip. Petals linear-lanceolate, almost equalling the sepals. Lip shortly clawed on to the base of the column, 3-lobed; lateral lobes large, erect; middle lobe smaller, caudate, reflexed; disc and middle lobe with several rows of small stalked calli. Column slender, curved, winged; wings produced upwards into 2 toothed lobes. Stigma prominent, placed just under the rostellum. Anther terminal, erect, 2-celled; pollinia 4 in each cell, granular.

The genus is limited to two species: one endemic in New Zealand, the other (*A. Nortoni* Fitzgerald) in Australia. It is closely allied to both *Caladenia* and *Chiloglottis*, differing from the former in the wing of the column extending behind the anther, and from the latter in the solitary leaf and glandular-pubescent perianth.

1. **A. gracilis** *Hook. f. Fl. Nov. Zel.* i (1853) 246, t. 56A.—Stem slender, glabrous, 5–10 in. high. Leaf sessile half-way up the stem, ½–1 in. long, ovate or ovate-oblong, acute, membranous, veins reticulated. Flower about ½ in. diam., more or less finely glandular-pubescent. Ovary narrow, cylindrical, ½–¾ in. long. Upper sepal adnate to the back of the column towards the base, acuminate; lateral sepals and petals subsimilar, erect, acuminate. Lip much shorter than the sepals and petals and almost concealed by them; middle lobe much smaller than the lateral, caudate, reflexed; calli numerous, stipitate, yellow. Column broadly winged for its whole length, wings produced upwards behind the anther into two broad toothed lobes.—*Handb. N.Z. Fl.* (1864) 265; *Cheesem. Man. N.Z. Fl.* (1906) 691.

North Island: Forests between the Thames and Mercury Bay, *T. Kirk!* forests near the summit of Mount Kakaramea, Taupo, *T. F. C.;* between Ohakune and Mount Ruapehu, *E. Phillips Turner!* near Lake Waikaremoana, *Colenso.* South Island: Nelson—Near Foxhill, *P. Lawson!* Buller Valley, *T. F. C.;* Mount Owen, *W. Townson!* Otago—Mount Maungatua, forests to the west of Lake Te Anau, *Petrie!* near Lake Hauroto, *Thomson!* 500–2500 ft. November–January.

19. **TOWNSONIA** Cheesem. 1906.

A small slender terrestrial herb. Root of creeping fleshy caudicles thickened here and there into small tubers. Radical leaves 1–3 from the caudicles, rarely at the base of the flowering-stem, petiolate, ovate-orbicular. Cauline leaf or empty bract solitary half-way up the stem, sessile, ovate, acute, often much reduced in size. Flowers 1 or 2, small; perianth horizontal or deflexed. Upper sepal much incurved, broad, concave, almost galeate; lateral placed in front of the lip, lanceolate, margins involute. Petals minute, erect. Lip clawed on to the base of the column; lamina erect, undivided, broadly ovate-rhomboid, subcordate at the base, entire, margins involute and clasping the column towards the base; disc smooth, without calli or ridges, or with an obscure thickening on each side near the base. Column rather shorter than the lip, erect, broadly and equally winged from the base; wings not continued upwards behind the anther. Stigma prominent, placed just under the small rostellum. Anther terminal, erect, 2-celled; pollinia free, granular. Hatch T.R.S.N.Z. 77: 227.

A very curious little plant. It has the habit of *Adenochilus*, but differs in the smooth undivided lip, minute petals, and in the column-wings not being produced upwards behind the anther. The smooth undivided lip also separates it from *Chiloglottis, Caladenia, Burnettia,* and other allied genera. The genus has been studied in detail by Dr. Schlechter, who has published his results in a paper entitled "Die Gattung *Townsonia*" (Fedde, Repertorium, ix (1911) 249). He considers that its nearest ally is *Acianthus*. He is further of opinion that the Tasmanian *Acianthus viridis* Hook. f. is a true *Townsonia*, and should be transferred to that genus. At the same time he admits that *Townsonia* differs in the broadly winged column, a character not found in *Acianthus* or allied genera. *Townsonia* is dedicated to its discoverer, Mr. W. Townson, late of Westport, but now of Thames, who is well known from his successful botanical exploration of the north-western portion of the South Island.

Ruppia Vict. Nat. 50: 18. 1933.

T. viridis (Hook. f.) Schltr. Fedde Report. 1911. 9: 249.

1. **T. deflexa** *Cheesem. Man. N.Z. Fl.* (1906) 692.—Very slender, 3–6 in. high. Radical leaves on slender petioles ½–1½ in. long; blade ¼–½ in., broadly oblong or orbicular-ovate, obtuse or apiculate, rounded or subcordate at the base, thin and membranous, veins reticulated. Cauline leaf ovate, acute, often very small and scale-like. Flowers small, ⅙–¼ in. long, greenish.—*Ill. N.Z. Fl.* ii (1914) t. 198B.

Acianthus viridis (Hook. f.) Fl. Tasm. 1860. 2: 372.

South Island: Nelson—Vicinity of Westport, *W. Townson!* Otago—Resolution Island, Dusky Sound, *W. A. Thomson!* November–December.

See Rupp. Bot. U.S. Mus. 1928. 53: 550–558 re Corybas (C. cheesemanii C. orbiculata R.)

20. CORYSANTHES R. Br.

Dwarf very delicate succulent terrestrial herbs. Root of small rounded tubers on fleshy caudicles. Leaf solitary, ovate-cordate or orbicular or reniform. Flower solitary, large for the size of the plant, at first almost sessile on the leaf, but peduncle elongating considerably in fruit. Upper sepal large, erect and incurved, helmet-shaped; lateral free, small and linear, or long and filiform. Petals similar to the lateral sepals but smaller, sometimes wanting. Lip large, the lower portion tubular, the margins meeting behind the column and enclosing it; base with a rounded auricle on each side of the column or with a hollow conical spur; upper part truncate or expanded into a broad abruptly reflexed limb; margins entire or denticulate or fimbriate. Column short, straight, 2-winged at the top; stigma broad, placed just under the rostellum. Anther large, terminal, erect, 2-celled; pollinia 4, powdery, free.

A very curious genus of about 20 species, found in Malaya, Australia, and New Zealand, the species of each country being endemic.

A. Lip produced downwards into 2 conical spurs at the base. Lateral sepals and petals minute.

Leaf $\frac{1}{4}$–$\frac{1}{2}$ in., sessile, ovate-cordate .. .. 1. *C. Cheesemanii.*

B. Lip with 2 rounded orifices at the base. Lateral sepals and petals filiform, longer than the lip (except in C. Carsei *and* Matthewsii).

Leaf $\frac{1}{4}$–$\frac{1}{2}$ in., ovate-cordate. Lateral sepals and petals small. Lip produced into a projecting lamina, not truncate .. .. 2. *C. Carsei.*

Leaf $\frac{1}{2}$–1 in., sessile, ovate- or orbicular-cordate. Lateral sepals and petals about $\frac{1}{2}$ as long as the lip. Lip truncate, entire or minutely denticulate .. .. 3. *C. Matthewsii.*

Leaf $\frac{3}{4}$–1$\frac{1}{2}$ in., sessile, ovate-oblong, rounded or cordate at the base. Lip truncate, coarsely toothed or fimbriate .. .. .. 4. *C. oblonga.*

Leaf $\frac{1}{2}$–2 in., sessile, oblong-ovate, acuminate. Upper sepal acuminate. Lip bent forwards and downwards, acuminate .. 5. *C. rivularis.*

Leaf $\frac{1}{2}$–1$\frac{1}{4}$ in., sessile or shortly petiolate, broadly oblong or orbicular, apiculate. Upper sepal acute. Lip abruptly reflexed and expanded, apex acute .. .. 6. *C. rotundifolia.*

Leaf $\frac{1}{2}$–2 in., petiolate, orbicular or reniform, 3-lobed at the tip. Upper sepal obtuse. Lip abruptly reflexed and expanded, apex rounded .. .. 7. *C. triloba.*

Large and stout, 2–8 in. high. Leaf on a petiole $\frac{1}{2}$–3 in. long; lamina $\frac{1}{2}$–3 in., broadly oblong or orbicular. Upper sepal acute. Lip large, abruptly reflexed and much expanded .. .. 8. *C. macrantha.*

1. **C. Cheesemanii** *Hook. f. ex T. Kirk in Trans. N.Z. Inst.* iii (1871) 180.—A very small species, $\frac{1}{2}$–1 in. high when in flower, rarely more. Leaf sessile, $\frac{1}{4}$–$\frac{1}{2}$ in. long, ovate-cordate or orbicular-cordate, apiculate, membranous, veins conspicuous when dry. Flower sessile or shortly peduncled, about $\frac{5}{8}$ in. long, dull-purple; bract short, sheathing. Upper sepal very large, helmet-shaped, curved over the lip, obtuse. Lateral sepals minute, subulate, erect, placed between the basal spurs of the lip. Petals frequently wanting, when present very minute, deflexed, placed under or behind the basal spurs of the lip. Lip very large, tubular, the margins involute and meeting behind the column and enclosing it, the base produced downwards on each side into a short conical spur; the mouth expanded and abruptly recurved; margins entire. Column short, stout, erect, with a large fleshy gland at the base. Anther terminal, very

large. Capsule $\frac{1}{3}$ in. long, linear-oblong, elevated on the greatly elongated peduncle, which is sometimes over 6 in. long.—*Hook. Ic. Plant.* (1872) t. 1120; *Cheesem. Man. N.Z. Fl.* (1906) 693.

North Island: Auckland—Kaitaia, *R. H. Matthews!* *H. Carse!* Helena Bay, *Mrs. E. Bradney!* vicinity of Auckland, *T. F. C.* South Island: Near Westport, *W. Townson!* June–July.

A very curious little plant, probably not uncommon, but easily overlooked, from its small size and early flowering-period. It is very closely allied to the Australian *C. bicalcarata*, and may prove identical with it.

Corybas Hatch 75:367.

2. **C. Carsei** (*Cheesem.*) *in Trans. N.Z. Inst.* xliv (1911) 162.—A small delicate species, $\frac{1}{2}$–$\frac{2}{3}$ in. high when in flower. Leaf sessile, $\frac{1}{4}$–$\frac{1}{2}$ in. long, ovate-cordate, acute, membranous. Flower sessile or very shortly pedunculate, about $\frac{1}{2}$ in. long, horizontal or deflexed, dull-purplish. Upper sepal very narrow at the base, then suddenly expanded, so that the upper two-thirds is broadly oblong and hood-shaped, extreme tip incurved and emarginate and slightly thickened and papillose. Lateral sepals placed under the lip, small, narrow-linear, 4–5 mm. long. Lateral petals still smaller, 3 mm. long. Lip large, tubular, the margins involute, meeting behind the column and enclosing it, orbicular or broader than long when spread out, extreme tip produced into a minute projecting lamina, between which and the overhanging emarginate tip of the upper sepal is the only entrance to the front of the flower. Immediately inside the entrance the surface of the lip is furnished with a broad patch of stiff papillae all pointing towards the interior of the flower, and which is continued as a narrow band down the median line of the lip. At the base of the lip the margins on each side are rolled up on themselves, thus forming two minute circular openings leading to the base of the flower. Column short, stout, curved. Capsule not seen.

North Island: Peaty swamps between Lake Tongonge and the coast, Mongonui County, *H. Carse* and *H. B. Matthews!*

A very curious little plant, closely allied to the Australian *C. unguiculata*. But, judging from Mr. Fitzgerald's beautiful drawing, that species has a much broader flower, the upper sepal is wider and not incurved or emarginate at the tip, the projecting lamina at the apex of the lip is much smaller, and the papillae within the lip are confined to the median line, whereas they also form a broad patch to the right and left of the median line in *C. Carsei*. There is also a relationship to *C. Matthewsii*; but, among other differences, that plant has a much narrower dorsal sepal, and the lip wants the projecting lamina of *C. Carsei*.

= Corybas unguiculatus (R. Br.) Reichb. f. Beitr. Syst. Pfl. 43

3. **C. Matthewsii** *Cheesem. in Trans. N.Z. Inst.* xxxi (1899) 351.—Small, delicate, $\frac{3}{4}$–$1\frac{1}{2}$ in. high. Leaf sessile, $\frac{1}{2}$–1 in. long, ovate-cordate or orbicular-cordate, acute or obtuse, membranous when dry, showing 1 or 2 circular veins on each side of the midrib connected by transverse veinlets. Flower shortly peduncled, about $\frac{1}{3}$ in. long, horizontal or drooping, purplish-green; bract small, erect. Upper sepal very narrow at the base, broadened above and hood-shaped, arched over the lip. Lateral sepals and petals small, linear-subulate, seldom more than $\frac{1}{2}$ as long as the lip. Lip large, involute, the margins meeting behind the column and enclosing it, orbicular-cordate when spread out; base with a rounded auricle on each side; apex truncate, entire or very slightly denticulate; disc with a thickened patch covered with deflexed hairs. Column short, stout, curved, swollen in front at the base.—*Cheesem. Man. N.Z. Fl.* (1906) 693; *Ill. N.Z. Fl.* ii (1914) t. 199A.

Corybas matthewsii (Cheeseman) Schltr. in Fedde Repert. 1923, 19:23.

NORTH ISLAND: Auckland—Kaitaia (Mongonui County), *R. H. Matthews! H. B. Matthews! H. Carse!* Aponga (Whangarei County), *A. Thompson!*

Clearly allied to *C. oblonga*, but the flower is larger, the lateral sepals and petals much reduced in size, the upper sepal narrower at the base and more hood-shaped at the top, and the margin of the lip is not coarsely fringed.

Corybas oblongus (Hook. f.) Reichb. f. Beitr. Syst. Pl. 67.

4. **C. oblonga** *Hook. f. Handb. N.Z. Fl.* (1864) 266.—Variable in size, ½–2 in. high. Leaf sessile, ¾–1½ in. long, ovate-oblong, apiculate, rounded or cordate at the base, thin and membranous, conspicuously veined when dry. Flowers small, shortly peduncled, solitary or very rarely two together, about ¼ in. long, reddish-purple; bract rather large, sometimes foliaceous, erect. Upper sepal narrow, concave, oblong when spread out, obtuse or apiculate, arched over the lip. Lateral sepals and petals filiform, ¼–¾ in. long. Lip involute, the margins meeting behind the column and enclosing it, broadly semicordate when spread out; base with a rounded auricle or orifice on each side; apex truncate, coarsely toothed or fimbriate, centre of disc with minute dentiform papillae. Column short, stout, curved to the front, with a swelling at the base.—*Cheesem. Man. N.Z. Fl.* (1906) 694; *Ill. N.Z. Fl.* ii (1914) t. 199B. Nematoceras oblonga *Hook. f. Fl. Nov. Zel.* i (1853) 250, t. 57B.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon on moist shaded banks from the North Cape southwards. AUCKLAND ISLANDS: North arm of Carnley Harbour, *B. C. Aston!* Sea-level to 2000 ft. September–November.

Corybas rivularis (Hook. f.) Reichb. f. Beitr. Syst. Pl. 67

5. **C. rivularis** *Hook. f. Handb. N.Z. Fl.* (1864) 266.—Very delicate and membranous, 1–2½ in. high. Leaf sessile, ½–2 in. long, ovate or oblong-ovate, acuminate, deeply cordate or almost 2-lobed at the base, very thin and membranous, veins conspicuous, reticulated. Flower shortly pedunculate or sessile between the lobes of the leaf, ⅓–½ in. long; bract narrow, acuminate. Upper sepal narrow, concave, arched over the lip, gradually tapering into a long filiform point. Lateral sepals and petals filiform, 1–2 in. long, the petals usually exceeding the sepals. Lip involute, the margins meeting behind the column and enclosing it, broadly ovate-cordate when spread out; base with a rounded auricle or orifice on each side; upper portion curved forwards and downwards, acuminate or apiculate, margins undulate, entire. Column very short, stout, erect.—*Cheesem. Man. N.Z. Fl.* (1906) 694. Nematoceras rivularis *Hook. f. Fl. Nov. Zel.* i (1853) 251. Acianthus rivularis *A. Cunn. Precur.* (1836) n. 312; *Hook. f. Fl. Antarct.* i (1844) 71.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, AUCKLAND ISLANDS: In damp wooded ravines from the North Cape southwards, but often local. Sea-level to 2000 ft. September–November.

A very remarkable and distinct species, easily recognized by the thin acuminate leaf, very long filiform petals and lateral sepals, by the filiform point to the upper sepal, and acuminate lip.

Rea Hatch 75: 367

6. **C. rotundifolia** *Hook. f. Handb. N.Z. Fl.* (1864) 266.—Variable in size, ½–2 in. high. Leaf sessile or shortly petiolate, ½–1¼ in. long, broadly oblong or orbicular, tip rounded and apiculate, deeply cordate or 2-lobed at the base, rather fleshy, membranous when dry, veins reticulated. Peduncle at first very short, but elongating as the flower withers. Flower ½ in. long, dull-purple or purplish-green; bract short. Upper sepal narrow, concave, arched over the lip, acuminate. Lateral sepals and petals filiform, 1–1½ in. long. Lip tubular below, the margins meeting behind the column

and enclosing it, base with a rounded auricle on each side; upper part abruptly recurved and expanded, tip acute, margins very minutely denticulate. Column short, stout, bent backwards.—*Cheesem. Man. N.Z. Fl.* (1906) 695. C. orbiculata *Col. in Trans. N.Z. Inst.* xxiii (1891) 389. Nematoceras rotundifolia *Hook. f. Fl. Nov. Zel.* i (1853) 251.

Var. **pandurata** *Cheesem.*—Leaves deeply lobed on each side, so as to be almost panduriform. Other characters precisely as in the type.

North and South Islands, Stewart Island, Auckland and Campbell Islands: Moist wooded ravines throughout, but often local. Sea-level to 2500 ft. September–December. Var. *pandurata:* Kaitaia (Mongonui County), *R. H. Matthews!*

This may not be the *C. rotundifolia* of the Handbook, which is described as having a truncate lip. It differs from *C. rivularis* in the more coriaceous leaf, with a rounded tip, in the upper sepal not being produced into a filiform point, and in the broader reflexed portion of the lip. From small forms of *C. macrantha* it is best distinguished by the almost sessile leaf and much smaller lip with an acute or acuminate tip.

Corybas trilobatus (Hook.f.) Reichb.f. Beitr. Syst. Fl. 67

7. **C. triloba** *Hook. f. Handb. N.Z. Fl.* (1864) 265.—Rather stout, variable in size. Leaf on a petiole ½–2 in. long; blade ½–1½ in. diam., reniform or orbicular, more or less distinctly 3-lobed at the tip, middle lobe acute, cordate at the base, fleshy when fresh, membranous when dry. Peduncle at first short, but elongating as the flower withers, and in fruit often 4–8 in. long. Flower ⅓–½ in. long, dull-purple; bract rather small. Upper sepal narrow at the base, dilated above, obovate-spathulate when spread out, arched over the lip, concave, obtuse at the tip. Lateral sepals and petals filiform, erect, ¾–2 in. long. Lip involute, tubular below, the margins meeting behind the column and enclosing it, and with a rounded auricle or orifice at the base on each side; upper part abruptly reflexed and much expanded laterally and downwards, forming a broad saucer-like entrance to the flower; margins erose or nearly entire. Column short, stout, bent backwards.—*Cheesem. Man. N.Z. Fl.* (1906) 695. C. hypogea *Col. in Trans. N.Z. Inst.* xvi (1884) 336. Nematoceras triloba *Hook. f. Fl. Nov. Zel.* i (1853) 250.

North and South Islands, Stewart Island: Shaded places from the North Cape southwards, but often local. Sea-level to 4000 ft. July–September. June 4.B.

Corybas macranthus (Hook.f.) Reichb.f.

8. **C. macrantha** *Hook. f. Handb. N.Z. Fl.* (1864) 266.—Much larger than the other species, 2–8 in. high or more. Leaf on a petiole ½–3 in. long; lamina ¾–2 in. diam., broadly oblong or orbicular, obtuse or apiculate or rarely 3-lobed at the tip, cordate or 2-lobed at the base, thick and fleshy when fresh, thin and membranous when dry, veins finely reticulate. Peduncle from the base of the petiole, at first short, but elongating as the flower withers, often 4–10 in. long in fruit. Flower large, ½–1 in. long, dark-purple; bract small. Upper sepal narrow, concave, arched over the lip, somewhat expanded above, acute or acuminate. Lateral sepals and petals filiform, 1–2 in. long. Lip large, tubular below, the margins meeting behind the column and enclosing it, base with a rounded auricle on each side, upper part abruptly recurved and much expanded all round, margins undulate, minutely erose or denticulate. Column short, stout, bent backwards.—*Cheesem. Man. N.Z. Fl.* (1906) 696. C. papillosa *Col. in Trans. N.Z. Inst.* xvi (1884) 337. Nematoceras macrantha *Hook. f. Fl. Nov. Zel.* i (1853) 229, t. 57A.

See also Hatch 76:519 & 580.

North and South Islands, Stewart Island, Chatham Islands, Auckland and Campbell Islands: Not uncommon in damp shaded places throughout. Sea-level to 4000 ft. October–December.

Closely allied to *C. triloba*, but much larger, the leaves rarely 3-lobed at the tip, the upper sepal acute or acuminate, and the lip larger. Both it and *C. triloba* frequently have the peduncle bent backwards, so that the flower lies with the upper sepal uppermost and the lip above.

1870 : 330.

21. GASTRODIA R. Br. See Hook. 77 : 232.

Leafless terrestrial brownish herbs. Root long, tuberous, usually parasitic on the roots of other plants. Stem simple, erect, furnished with lax sheathing scales. Flowers in a terminal raceme. Sepals and petals connate into a ventricose 5-lobed tube more or less slit on the anterior side. Lip shorter than the perianth, attached at the base to the foot of the column, and adnate at the back to the perianth-tube; lamina erect, furnished with longitudinal raised lines or naked, margins undulate. Column long or short, narrowly 2-winged; rostellum small; stigma near the base of the column, prominent. Anther lid-like, incumbent; pollinia free, granular.

A small genus of 10 or 12 species, ranging from New Zealand and Australia northwards to Malaya, the Himalayas, China, and Japan.

Raceme 2–8 in., many-flowered. Perianth $\frac{3}{4}$ in. Column elongated, $\frac{2}{3}$ the length of the lip	1. *G. sesamoides.*
Raceme 6–12 in., very many flowered. Perianth $\frac{1}{2}$ in. Column very short, barely $\frac{1}{4}$ the length of the lip	2. *G. Cunninghamii.*
Stem slender, almost filiform. Raceme 1–3 in., 3–5-flowered. Perianth $\frac{1}{2}$ in. Column very short, barely $\frac{1}{4}$ the length of the lip	3. *G. minor.*

G. Hectori Buch. in Trans. N.Z. Inst. xix (1887) 214 is shown by the specimens in Mr. Buchanan's herbarium to be a *Prasophyllum*, probably *P. patens* R. Br.

1. **G. sesamoides** *R. Br. Prodr.* (1810) 330.—Root very long and tuberous. Stem stout or slender, 1–2½ ft. high, mottled grey; sheathing scales loose, truncate or with an obtuse point. Raceme 2–8 in. long, many-flowered; bracts scarious, broadly ovate, shorter than the pedicels. Flowers brownish-white, about $\frac{2}{3}$ in. long without the ovary, drooping. Perianth ventricose, gibbous at the base, shortly 5-lobed; lobes short and broad, ovate, constricted at the base. Lip slightly shorter than the perianth; lamina oblong, with 2 thick ridges up the median line, which coalesce into one near the tip, margins much crisped and undulate. Column elongate, almost as long as the lip, angular, narrowly winged above; stigma a large protuberance at the very base.—*Hook. f. Fl. Tasm.* ii (1860) 31, t. 126; *Benth. Fl. Austral.* vi (1873) 309; *Fitzgerald Austral. Orch.* ii (1891) pt. 5; *Cheesem. Man. N.Z. Fl.* (1906) 697.

North Island: Auckland—Kaitaia, *R. H. Matthews! H. B. Matthews!* Northern Wairoa, *T. F. C.;* Opepe, Taupo, *T. F. C.;* East Cape district, *Adams* and *Petrie!* South Island: Westland, Kelly's Creek, *Petrie!* Sea-level to 1500 ft. December–January.

The long slender column at once separates this from the following species, which it otherwise much resembles. In Australia it ranges from Queensland to Tasmania.

2. **G. Cunninghamii** *Hook. f. Fl. Nov. Zel.* i (1853) 251.—Habit and appearance of *G. sesamoides* but usually smaller and more slender, 1–3 ft. high or even more. Stem brownish, often striped and spotted with purple or fawn colour. Raceme 6–10 in. long, very many flowered, pedicels slender, $\frac{1}{5}$–$\frac{1}{3}$ in.; bracts ovate, acute, scarious. Flowers brownish-white, $\frac{1}{2}$ in. long

without the ovary, drooping. Perianth tubular, much swollen at the base, split half-way down on the anterior face, shortly 5-lobed; lobes broad, ovate-deltoid, acute. Lip rather shorter than the perianth; lamina narrow trowel-shaped with 2 papillose ridges running up the middle and uniting near the tip; margins involute, membranous, much crisped and undulate. Column very short, barely $\frac{1}{4}$ the length of the lip.—*Handb. N.Z. Fl.* (1864) 263; *Petrie in Trans. N.Z. Inst.* xxv (1893) t. 20, f. 1–4; *Cheesem. Man. N.Z. Fl.* (1906) 697. G. leucopetala *Col. in Trans. N.Z. Inst.* xviii (1886) 268.

North and South Islands, Stewart Island, Chatham Islands: Not uncommon in dark shaded places, but easily overlooked. Sea-level to 2000 ft. *Perei; Makaika.* November–January.

The starchy thick and tuberous root was formerly collected by the Maoris and eaten, especially in the Urewera district.

3. **G. minor** *Petrie in Trans. N.Z. Inst.* xxv (1893) 273, t. 20, f. 5–7.—Stem umber-brown, not spotted, very slender, 8–15 in. high, $\frac{1}{12}$ in. diam. at the base; sheathing scales few, oblique. Raceme 1–3 in. long, 3–5-flowered; pedicels slender, $\frac{1}{5}$ in. long; bracts short, broad, scarious. Flowers brownish tipped with dirty-white, $\frac{1}{2}$ in. long without the ovary, drooping. Perianth ventricose, gibbous at the base, split about half-way down on the anterior side, shortly 5-lobed; lobes rounded-ovate, undulate. Lip hardly shorter than the perianth; lamina linear-oblong, obtuse, with 2 thick median ridges; margins incurved, thickened, slightly crumpled. Column very short, barely $\frac{1}{4}$ the length of the lip.—*Cheesem. Man. N.Z. Fl.* (1906) 697.

South Island: Otago—Opihi Creek, near Dunedin, *Petrie!* January.

Dried specimens differ very little in appearance from slender forms of *G. Cunninghamii;* but according to Mr. Petrie there are important differences in the lip and column.

Family XXIV. **PIPERACEAE.**

Herbs or shrubs, often aromatic and stimulating. Leaves alternate or opposite or whorled, simple, entire; stipules wanting, or 2 connate, or adnate to the petiole. Flowers minute, hermaphrodite or unisexual, crowded on axillary or terminal catkin-like spikes, each subtended by a sessile or stipitate bract. Perianth wanting. Stamens 2 or more, hypogynous; filaments very short; anthers often jointed on the filaments, cells 2 or confluent. Ovary (except in the tribe *Saurureae*, which does not occur in New Zealand) 1-celled, with a single orthotropous ovule; style wanting or very short; stigmas 1–6, various in shape. Fruit a small indehiscent berry. Seed solitary, globose or ovoid or oblong; albumen copious, farinaceous; embryo very minute, enclosed in a sac at the apex of the seed.

A large family, with some trifling exceptions confined to tropical and subtropical regions, and far more abundant in tropical America than anywhere else. Genera 8; species given at 1,000, but probably overestimated. Aromatic and stimulating properties prevail through the greater part of the family. The common pepper has been used as a spice since the times of Alexander, and other species of *Piper* can be similarly employed. The use of the betel (*Piper betel*) as a masticatory is well known, also that of the kava (*Macropiper methysticum*) to prepare an intoxicating drink.

Usually shrubby. Anther-cells 2, distinct. Stigmas 2–4 .. 1. Macropiper.
Small fleshy herbs. Anther-cells confluent. Stigmas usually penicillate. Fruit very small .. .. 2. Peperomia.

1. **MACROPIPER** Miq.

Shrubs or small trees ; branches often jointed and swollen at the nodes. Leaves alternate, entire, equal or unequal at the base ; stipules often adnate to the petiole. Spikes unisexual, dense, axillary, solitary or 2–3 together in the upper axils. Flowers very small and numerous, densely packed. Stamens 2–3 ; cells of the anthers distinct, parallel or divergent. Berries numerous in the spike, often connate with the bracts and rhachis into a subsucculent or fleshy fruit.

A small genus of some 5 or 6 species, found in New Zealand, Norfolk Island, Lord Howe Island, and thence eastwards to Tahiti and northwards to New Guinea.

1. **M. excelsum** (*Miq. Syst. Pip.* (1843) 221.—An aromatic prefectly glabrous densely branched shrub or small tree 8–20 ft. high ; branches smooth, flexuose, jointed and swollen at the nodes. Leaves petiolate, 2–5 in. long including the petiole, orbicular-cordate or broadly ovate, shortly acuminate, cordate at the base or sometimes truncate or rounded,

228 ; *Handb. N.Z. Fl.* (1864) 254 ; *Cheesem. Man. N.Z.* Fl. (1906) 596.

Var. **psittacorum** *R. M. Laing in Trans. N.Z. Inst.* xlvii (1915) 22.—Leaves larger, 4–8 in. long, usually 9-nerved. Spikes longer, often over 6 in. long.—*W. R. B. Oliver in Trans. N.Z. Inst.* xlix (1917) 132. Piper psittacorum *Endl. Prodr. Norflk.* (1833) 37.

KERMADEC ISLANDS : Var. *psittacorum* abundant, *McGillivray, T. F. C., W. R. B. Oliver!* NORTH ISLAND : Var. *psittacorum* common on the Three Kings Islands, also on the Poor Knights, the Little Barrier, and Tiritiri Islands ; the ordinary form abundant in lowland districts. SOUTH ISLAND : Near the coast-line from Nelson and Marlborough southwards to Banks Peninsula and Okarito. CHATHAM ISLANDS : Not uncommon, *H. H. Travers! F. A. D. Cox!* *Kawakawa ; Pepper-tree.* Flowers most of the year.

The variety plentiful in Norfolk Island and Lord Howe Island, also recorded from Tahiti and others of the Pacific islands. The fruit and leaves of the ordinary form are aromatic and stimulating, and a decoction of the latter has been used for toothache.

2. **PEPEROMIA** Ruiz and Pavon.

Annual or perennial herbs, usually succulent. Leaves alternate or opposite or whorled, fleshy or more rarely membranous, often pellucid-dotted ; stipules wanting. Spikes slender, terminal or axillary or leaf-opposed, solitary or fascicled. Flowers hermaphrodite, minute, sessile or sunk in the rhachis of the spike, bracteate ; the bract frequently peltate. Perianth wanting. Stamens 2 ; filaments very short ; anther-cells confluent. Ovary sessile, obtuse or acute, 1-celled ; stigma usually penicillate ; ovule solitary, erect. Fruit minute, indehiscent ; seed with a membranous testa.

without the ovary, drooping. Perianth tubular, much swollen at the base, split half-way down on the anterior face, shortly 5-lobed; lobes broad, ovate-deltoid, acute. Lip rather shorter than the perianth; lamina narrow trowel-shaped with 2 papillose ridges running up the middle and uniting near the tip; margins involute, membranous, much crisped and undulate. Column very short, barely $\frac{1}{4}$ the length of the lip.—*Handb. N.Z. Fl.* (1864) 263; *Petrie in Trans. N.Z. Inst.* xxv (1893) t. 20, f. 1–4; *Cheesem. Man. N.Z. Fl.* (1906) 697. G. leucopetala *Col. in Trans. N.Z. Inst.* xviii (1886) 268.

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Usually shrubby. Anther-cells 2, distinct. Stigmas 2–4 .. 1. Macropiper.
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A small genus of some 5 or 6 species, found in New Zealand, Norfolk Island, Lord Howe Island, and thence eastwards to Tahiti and northwards to New Guinea.

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Kermadec Islands : Var. *psittacorum* abundant, *McGillivray, T. F. C., W. R. B. Oliver !* North Island : Var. *psittacorum* common on the Three Kings Islands, also on the Poor Knights, the Little Barrier, and Tiritiri Islands ; the ordinary form abundant in lowland districts. South Island : Near the coast-line from Nelson and Marlborough southwards to Banks Peninsula and Okarito. Chatham Islands : Not uncommon, *H. H. Travers ! F. A. D. Cox !* *Kawakawa ; Pepper-tree.* Flowers most of the year.

The variety plentiful in Norfolk Island and Lord Howe Island, also recorded from Tahiti and others of the Pacific islands. The fruit and leaves of the ordinary form are aromatic and stimulating, and a decoction of the latter has been used for toothache.

2. **PEPEROMIA** Ruiz and Pavon.

Annual or perennial herbs, usually succulent. Leaves alternate or opposite or whorled, fleshy or more rarely membranous, often pellucid-dotted ; stipules wanting. Spikes slender, terminal or axillary or leaf-opposed, solitary or fascicled. Flowers hermaphrodite, minute, sessile or sunk in the rhachis of the spike, bracteate ; the bract frequently peltate. Perianth wanting. Stamens 2 ; filaments very short ; anther-cells confluent. Ovary sessile, obtuse or acute, 1-celled ; stigma usually penicillate ; ovule solitary, erect. Fruit minute, indehiscent ; seed with a membranous testa.

A large genus of about 500 species, widely spread in almost all tropical regions, but most plentiful in South America.

Leaves in whorls of 4, coriaceous when dry. Spikes terminal.. 1. *P. tetraphylla.*
Leaves alternate, thin and membranous when dry. Spikes terminal and axillary .. .. 2. *P. Urvilliana.*

(Forst. f.)

1. **P. tetraphylla** *Hook. and Arn. Bot. Beech. Voy.* (1830–41) 96.—Small, succulent, erect or spreading, much branched from the base, 4–9 in. high; branches deeply grooved when dry, pubescent at the nodes. Leaves in whorls of 3 or 4, rarely opposite, shortly petiolate or almost sessile, ¼–½ in. long, elliptic-rhomboidal or almost orbicular, obtuse, fleshy when fresh, coriaceous when dry, dark-green above, paler beneath, minutely punctate; young leaves beneath and petioles finely pubescent; veins obscure. Spikes slender, terminal, pedunculate, ¾–1½ in. long, dense-flowered; peduncle and rhachis pubescent. Bract orbicular-peltate, almost sessile. Ovary partly immersed in the rhachis, ovate, acute; stigma capitellate. Berry exserted, ovoid, reddish, $\frac{1}{20}$ in. long.—*W. R. B. Oliver in Trans. N.Z. Inst.* xlix (1917) 133. P. reflexa *A. Dietr. Sp. Plant.* i (1831) 180; *Benth. Fl. Austral.* vi (1873) 206; *Cheesem. Man. N.Z. Fl.* (1906) 596. P. novae-zealandiae *Col. in Trans. N.Z. Inst.* xxvii (1895) 394. Piper tetraphyllum *Forst. f. Prodr.* (1786) n. 25. P. aemulum *Endl. Prodr. Fl. Norfl.* (1833) 36.

North Island: Woods near the East Cape, on prostrate logs or trunks of living trees, specially abundant in the valley of the Tuparoa River, and extending within 4 or 5 miles of the base of Mount Hikurangi, *G. T. Williams! H. Hill!*

A common plant in most tropical countries. It is found in several parts of Australia and Polynesia, advancing as near to New Zealand as Lord Howe Island and Norfolk Island.

e.?

2. **P. Urvilliana** *A. Rich. Fl. Nouv. Zel.* (1832) 356.—A small glabrous succulent herb 6–12 in. high; stems sparingly branched, prostrate and rooting at the base, ascending or erect above. Leaves alternate, shortly petiolate, ½–1¼ in. long, broadly obovate or elliptic-oblong, sometimes almost orbicular, rounded at the tip or rarely subacute, 3-nerved at the base, glabrous, very thick and fleshy when fresh, thin and often almost pellucid when dry. Spikes terminal and axillary, solitary, peduncled, 1–2 in. long. Bract orbicular-peltate. Ovary partly immersed; stigma discoid. Berry exserted or immersed at the base.—*A. Cunn. Precur.* (1836) n. 324; *Raoul Choix* (1846) 42; *Hook. f. Fl. Nov. Zel.* i (1853) 228; *Handb. N.Z. Fl.* (1864) 254. P. Endlicheri *Miq. Syst. Pip.* (1843) 102; *Cheesem. Man. N.Z. Fl.* (1906) 596. Piper simplex *Endl. Prodr. Fl. Norfl.* (1833) 37.

Kermadec Islands, North Island: In lowland stations on rocks and trees in damp shady places as far south as Taranaki and Hawke's Bay, from thence less common to Cook Strait. South Island: Limestone rocks in Golden Bay, Nelson, *B. C. Aston.* Flowers most of the year.

Also found in Norfolk Island and Lord Howe Island. I suspect that Colenso's *P. muricatulata* (Trans. N.Z. Inst. xxvii (1895) 393) is a large-leaved state, but there are no specimens in his herbarium, and it is impossible to be sure from the description alone.

Family XXV. **CHLORANTHACEAE.**

Shrubs or trees, rarely herbs, generally aromatic. Leaves opposite, usually toothed, petioles often connate at the base; stipules small, subulate. Flowers small, unisexual, in terminal or axillary spikes or panicles. Perianth wanting (rarely present in the female flowers). Stamens either 1 or 3 connate; filaments short and thick; anthers 2-celled, or when there are 3 the lateral 1-celled. Ovary 1-celled; stigma either sessile or style very short; ovule solitary, orthotropous, pendulous from the top of the cell. Fruit a small globose or ovoid drupe. Seed pendulous; testa membranous; albumen copious, fleshy; embryo minute, remote from the hilum, radicle inferior.

A small and unimportant family, comprising 3 genera and 35 species, mostly tropical or subtropical.

1. **ASCARINA** Forst. 1776. p. 117. t. 59.

Aromatic shrubs or small trees; branchlets jointed at the nodes. Leaves opposite, serrate, penniveined; petioles connate at the base into a short sheath; stipules small, subulate. Flowers minute, dioecious or monoecious, arranged in simple or branched spikes. Perianth wanting in both sexes. Male flowers: Stamen solitary; anther sessile, linear-oblong, cylindric, 2-celled; cells parallel, dehiscing longitudinally. Female flowers: Ovary naked, ovoid or subglobose; stigma sessile, truncate. Drupe small, putamen fragile.

A small genus of six species, all very closely allied, found in New Zealand and the Pacific islands from New Caledonia eastwards to Tahiti.

Leaves 2–4 in., ovate- or oblong-lanceolate, acuminate. Anthers $\frac{1}{8}$ in. long .. .. 1. *A. lanceolata.*
Leaves 1–2 in., elliptic-oblong or obovate-oblong, obtuse or acute. Anthers $\frac{1}{10}$ in. long .. .. 2. *A. lucida.*

1. **A. lanceolata** *Hook. f. in Journ. Linn. Soc.* (1856) 127.—A perfectly glabrous bushy shrub or small tree 6–15 ft. high, rarely more; branches dark purplish-red, striate when dry. Leaves 2–4 in. long including the petiole, ovate-lanceolate or oblong-lanceolate, acuminate, narrowed into the petiole, dark-green and glossy above, paler beneath; margins coarsely serrate, the teeth often curved and acute; petioles $\frac{1}{2}$–$\frac{3}{4}$ in. long. Spikes closely branched in a racemiform manner, 1–2 in. long; branches opposite, springing from the axils of a pair of connate bracts. Male flowers alone seen, rather closely placed, each one in the axil of a broadly ovate acute bract, and with a smaller bracteole on each side. Anther sessile, $\frac{1}{8}$ in. long, linear-oblong, cylindric; connective thick, produced at the tip into a minute usually recurved apiculus.—*Solms in DC. Prodr.* xvi, 1 (1869) 478; *Cheesem. Man. N.Z. Fl.* (1906) 597.

Kermadec Islands: Not uncommon in forest on Sunday Island, *McGillivray, T. F. C., W. R. B. Oliver!* June–September.

This was reduced to *A. lucida* in the Handbook, but appears to be sufficiently distinct in the larger and narrower more acuminate leaves, and larger anthers. The same species, or a very close ally, is found in Fiji, Samoa, and Rarotonga.

2. **A. lucida** *Hook. f. Fl. Nov. Zel.* i (1853) 228.—A perfectly glabrous closely branched shrub or small tree 10–25 ft. high, with a trunk 6–12 in. diam.; branches slender, terete, striate when dry, dark purplish-red.

Leaves 1–2 in. long including the petiole, obovate-oblong to elliptic-oblong or linear-oblong, obtuse or acute, cuneate at the base, dark-green and glossy above, often glaucous beneath, margins coarsely and often obtusely serrate ; petioles $\frac{1}{3}$ in. long. Spikes laxly branched in a racemiform manner, the females more slender and more sparingly divided than the males ; branches opposite, pendulous. Flowers minute, alternate, each one in the axil of a broadly ovate acute bract with a smaller bracteole on each side. Anther sessile, oblong, $\frac{1}{10}$ in. long. Female flowers sometimes 2 or 3 together. Ovary broadly ovoid ; stigma very broad, truncate. Ripe fruit not seen. — *Handb. N.Z. Fl.* (1864) 253 ; *T. Kirk Forest Fl.* (1889) t. 129 ; *Cheesem. Man. N.Z. Fl.* (1906) 598 ; *Ill. N.Z. Fl.* ii (1914) t. 166. A. rubricaulis *Solms in DC. Prodr.* xvi, 1 (1869) 478 (*in part*).

North Island : Auckland—Hokianga, *Buchanan ;* Bay of Islands, *T. Kirk ;* Whangarei, *H. Carse, T. F. C. ;* Little Barrier Island, *T. F. C. ;* Coromandel, *Petrie !* Waitakarei Ranges, *T. F. C. ;* near Waihi, *Petrie !* Taranaki — Mount Egmont, *Buchanan.* Wellington—Wairarapa Valley, *Colenso !* South Island : Marlborough—Queen Charlotte Sound, *Banks* and *Solander ;* Kenepuru, *J. Rutland !* Nelson—Cape Foulwind, *W. Townson !* Westland—Abundant along the whole length of the district, *Helms, Cockayne,* and others. Otago—Plentiful in the sounds of the south-west coast, *Hector, Buchanan, T. Kirk !* Stewart Island : *C. Trail* (*fide T. Kirk*). Sea-level to 2500 ft. September–November.

Although this extends along almost the whole length of the Dominion, it is only on the west coast of the South Island, from Westport to Preservation Inlet, that it is at all plentiful. Elsewhere it is extremely local.

Family XXVI. **FAGACEAE.**

Trees or shrubs. Leaves alternate, simple, penninerved, stipulate. Flowers monoecious. Male flowers in erect or pendulous spikes, or collected into globular or capitate clusters. Perianth simple, 4–6-lobed. Stamens 5–20, inserted at the base of the perianth ; filaments slender ; anthers 2-celled. Female flowers less numerous than the males, solitary or few together, often surrounded by scales or bracts which are frequently united into an entire or lobed involucre. Perianth adnate to the ovary or wanting ; limb minute. Ovary 3-celled, rarely 2–6-celled ; styles as many as the cells ; ovules geminate in each cell. Fruit a nut, enclosed or seated within the persistent and hardened involucre. Seed rarely more than one in each nut ; embryo with large and fleshy cotyledons ; radicle superior.

An important family, including 5 genera and about 375 species, for the most part confined to the Northern Hemisphere, and most abundant in the Temperate Zone, extending southwards to the mountains of the Malay Archipelago and Central America and Colombia, a very few species of one genus alone found in the South Temperate Zone. The order includes the oak, chestnut, and beech, and produces some of the most durable and valuable woods known. The single New Zealand genus is confined to the temperate portion of the Southern Hemisphere.

See Cockayne Monogr. Beech Fav. Arb. Dendrologica 1916 : 8 : 4 : 43 !

NOTHOFAGUS Blume.

Trees or rarely shrubs. Leaves evergreen in all the New Zealand species ; stipules caducous. Flowers monoecious. Males : 1 to 3 or 4 towards the top of a short erect or curved peduncle ; bracts numerous, caducous. Perianth campanulate, 4–6-lobed ; lobes imbricate. Stamens

8–16 or more; filaments filiform, exserted; anthers obling. Females: Minute, 1–3, sessile within a lobed involucre composed of several scales grown together at the base. Perianth-tube adnate to the ovary; limb 3–5-lobed. Ovary inferior, 3-celled; styles short, linear, stigmatose within; ovules 2 in each cell, pendulous from the top of the cell. Fruiting-involucres small, hard, lobed, armed with transverse scales or lamellae at the base; lobes ultimately splitting to the base. Nuts enclosed within the involucre, 3-celled. Seed pendulous; cotyledons plaited.

A genus composed of 13 or 14 species; 6 of which are endemic in New Zealand; 3 in Australia or Tasmania; and 4 or 5 from temperate South America. It is the southern representative of the beeches (*Fagus*) of the Northern Hemisphere, from which it only differs in the small evergreen leaves, few-flowered male heads, and in the small fruiting-involucres.

A. Fruiting-involucres clothed with recurved linear processes.

Leaves $\frac{1}{3}$–$\frac{1}{2}$ in., ovate-rhomboid, coriaceous, doubly crenate .. 1. *N. Menziesii.*

B. Fruiting-involucres with flat transverse lamellae.

Leaves $\frac{3}{4}$–1$\frac{1}{2}$ in., broadly ovate, obtuse, thin, veined, pubescent, deeply serrate .. .. 2. *N. fusca.*

Leaves $\frac{3}{4}$–1 in., oblong, apiculate, entire or obscurely toothed towards the tip .. .. 3. *N. apiculata.*

Leaves $\frac{2}{3}$–$\frac{3}{4}$ in., ovate, acute, entire, glabrous above, fulvous beneath. Involucre 4-valved .. .. 4. *N. Blairii.*

Leaves $\frac{1}{4}$–$\frac{3}{4}$ in., oblong, obtuse, entire, glabrous above, white beneath. Involucre 3-valved .. .. 5. *N. Solandri.*

Leaves $\frac{1}{6}$–$\frac{2}{3}$ in., ovate, acute, rounded or cordate at the base, glabrous above, white beneath. Involucre 3-valved .. .. 6. *N. cliffortioides.*

The six species of *Nothofagus* enumerated above constitute a large proportion of the forests of the South Island, and even in the central and southern portions of the North Island the area now or recently covered by several species of the genus is by no means small. The economic value of these forests is much larger than is usually supposed, and under the pressure of the world-wide scarcity of timber may be expected to become much greater. Under such circumstances, considerable interest attaches to the discovery by Dr. Cockayne of the remarkable fact that hybridism on an enormous scale is constantly taking place between several of the species of *Nothofagus*, and that the resulting hybrids intercross. Dr. Cockayne's conclusions cannot fail to affect our present ideas on the classification of the species. His work is still in progress; but I am happy to publish in this place a short memorandum furnished by him at my request, giving an abstract of the chief results of his work.

"Hybridism in *Nothofagus*: After a personal examination of the *Nothofagus* forests in many localities in Wellington, Nelson, Marlborough, Canterbury, Westland, Otago, and Southland, together with a critical examination of many hundreds of specimens (seedling to adult) collected in all parts of the *Nothofagus* area of distribution, I have, unhesitatingly, come to the following conclusions: (1.) That hybridism occurs to an astonishing extent in the genus, with *Nothofagus fusca* (in a wide sense) as one parent and *N. cliffortioides* or *N. Solandri*, as the case may be, as the other parent. (2.) That *N. fusca* is made up of a number of true-breeding varieties, of which the type (called by me var. *typica*) and var. *Colensoi* are two, but there are others; and these varieties cross both amongst themselves and with the two species already mentioned. (3.) That these hybrids show

every kind of combination imaginable between the essential characteristics of the species concerned—*i.e.*, shape and size of leaf; texture of leaf; colour; toothing of margin; venation; tomentum; leaf-base; leaf-apex. (4.) The *N. Menziesii* does not hybridize. (5.) That *N. Blairii* is merely a comprehensive series of hybrids, mainly *N. cliffortioides* and × *fusca*. (6.) That *N. apiculata* is certainly another series, for the most part, but the 'type' may be a species; though, judging from Colenso's specimens, all seem taken from *one* tree. (7.) That seedlings from hybrid trees are of an extremely mixed character. (8.) That probably *N. cliffortioides* and *N. Solandri* cross; at any rate, the latter as figured in the 'Icones Plantarum' is comparatively rare.—L. COCKAYNE."

(Hook. f.)

1. **N. Menziesii** *Oerst. in Vidensk. Selsk. Skr.* v, ix (1873) 355.—A tall forest-tree 60–80 ft. or even 100 ft. high; trunk 2–5 ft. diam. or more; bark white and silvery, especially in young trees; branchlets clothed with fulvous pubescence. Leaves evergreen, shortly petiolate, $\frac{1}{3}$–$\frac{1}{2}$ in. long, broadly ovate-deltoid or rhomboid or almost orbicular, obtuse, shortly unequally cuneate at the base, thick and coriaceous, rigid, glabrous except the petiole, irregularly doubly crenate; margins thickened; stipules membranous, reddish, pubescent. Male flowers solitary, on short curved peduncles in the lower axils of the branchlets. Perianth 4–6-lobed. Stamens 6–12. Female involucres in the upper axils, 2–3-flowered. Fruiting-involucres $\frac{1}{4}$–$\frac{1}{3}$ in. long, faintly pubescent; lobes with 5–7 transverse rows of recurved linear processes tipped with an obtuse gland. Nuts puberulous, 3- or more rarely 2-winged, wings produced upwards into sharp flat points.—Fagus Menziesii *Hook. f. in Hook. Ic. Plant.* (1844) t. 652; *Raoul Choix* (1846) 42; *Hook. f. Handb. N.Z. Fl.* (1864) 249; *T. Kirk Forest Fl.* (1889) t. 89; *Cheesem. Man. N.Z. Fl.* (1906) 640.

NORTH ISLAND: Mountain forests from the Thames goldfields southwards, but rare and local to the north of the East Cape. SOUTH ISLAND: Hilly and mountain forests from Nelson to Foveaux Strait, most plentiful on the west side of the Island. Sea-level to 3500 ft. *Tawhai; Tawai; Silver-beech.* November–January.

Easily distinguished by the rigid doubly toothed leaves and recurved glandular processes on the fruiting-involucres. The wood is dark-red, strong and compact, and easily worked, but is not durable when exposed to the weather. It has been recommended for furniture, tubs and buckets, wine-casks, &c., but is not largely used at the present time.

It is worth remarking that the tips of the branches are sometimes diseased and converted into much-branched paniculate masses clothed with fulvous imbricating scales, closely resembling a paniculate inflorescence in young bud. On the under-surface of the leaves, at the junction of the main veins with the midrib, there are usually 1–3 curious fringed pits or domatia, very similar to those on the leaves of certain *Coprosmas*.

(Hook. f.)

2. **N. fusca** *Oerst. in Vidensk. Selsk. Skr.* v, ix (1873) 355.—A noble forest-tree 60–100 ft. high; trunk 4–8 ft. diam.; bark dark-brown or black in old plants, deeply furrowed, smooth and greyish-white on young trees; branchlets and petioles pubescent. Leaves evergreen, petiolate, $\frac{3}{4}$–$1\frac{1}{2}$ in. long, broadly ovate or ovate-oblong, obtuse or rarely acute, cuneate at the base, rather thin but firm, pubescent above and glandular beneath when young, glabrous when old, deeply and sharply serrate, veins conspicuous; stipules linear-oblong, caducous. Male flowers 2–3 at the end of a short curved axillary peduncle or more rarely solitary, drooping. Perianth 5-toothed, membranous, pubescent. Stamens 8–16. Female involucres

solitary in the upper axils, 2–3-flowered. Fruiting-involucres $\frac{1}{3}$–$\frac{1}{2}$ in. long, ovoid-globose, viscid-pubescent, 4-lobed; lobes furnished at the back with 3–5 transverse lamellae with entire or fringed margins. Nuts pubescent, 2–3-winged, wings produced upwards into entire or toothed points.—Fagus fusca *Hook. f. in Hook. Ic. Plant.* (1844) t. 631; *Raoul Choix* (1846) 42; *Hook. f. Fl. Nov. Zel.* i (1853) 229; *Handb. N.Z. Fl.* (1864) 249; *T. Kirk Forest Fl.* (1889) t. 90; *Cheesem. Man. N.Z. Fl.* (1906) 641.

Var. **Colensoi** *Hook. f. Fl. Nov. Zel.* i (1853) 229.—Leaves more coriaceous; teeth smaller, obtuse.—*Ic. Plant.* (1844) t. 630; *T. Kirk Forest Fl.* (1889) t. 90, f. 2. Fagus truncata *Col. in Trans. N.Z. Inst.* xxxi (1899) 280.

North Island: In forests from Mangonui and Kaitaia southwards, but local to the north of the East Cape. South Island: From Nelson to Foveaux Strait, but rare in Canterbury and eastern Otago. Sea-level to 3500 ft. *Tawhai; Tawhai-rau-nui; Red-beech.* October–December.

A magnificent tree, undoubtedly the finest representative of the genus in New Zealand, and well marked off by the comparatively thin veined leaves with sharply toothed margins. Wood dark-red, strong and compact, more durable than that of the other species, and frequently used for wharves, bridges, fencing-posts, &c.

3. **N. apiculata** *Cockayne in Trans. N.Z. Inst.* xliii (1911) 172.—A tall handsome tree 40 ft. high or more; trunk 2 ft. diam.; bark pale, smooth; branchlets pubescent. Leaves petiolate, $\frac{3}{4}$–1 in. long, oblong or ovate-oblong or elliptic-oblong, apiculate, cuneate at the base, rather thin, glabrous, quite entire or minutely or irregularly crenulate, veins not very conspicuous; stipules membranous, linear-oblong. Male flowers 1 or rarely 2 at the end of a short axillary peduncle, drooping. Perianth campanulate, membranous, 5-toothed. Stamens 8–14. Female involucres solitary in the axils of the leaves above the male inflorescence, 2–3-flowered. Fruiting-involucres $\frac{1}{4}$–$\frac{1}{3}$ in. long, narrow-ovoid, pubescent, 4-lobed; lobes with 2–4 transverse lamellae. Nuts pubescent, 2–3-winged, wings produced upwards into entire points.—Fagus apiculata *Col. in Trans. N.Z. Inst.* xvi (1884) 335; *T. Kirk Forest Fl.* (1889) t. 135; *Cheesem. Man. N.Z. Fl.* (1906) 642; *Ill. N.Z. Fl.* ii (1914) t. 182.

Var. **dubia** *Cheesem. Man. N.Z. Fl.* (1906) 642.—Leaves more coriaceous, oblong or oblong-obovate, obtuse or rarely apiculate, slightly pubescent beneath, upper half obscurely toothed or sinuate.—Fagus fusca *var.* dubia *and var.* obsoleta *T. Kirk Forest Fl.* (1889) t. 91.

North Island: Hawke's Bay—Forests near Dannevirke and Norsewood, *Colenso!* Var. *dubia:* Mungaroa and other localities near Wellington, *T. Kirk!* Tararua Mountains, *Petrie!* South Island: Marlborough, Mount Fyffe, *Cockayne.*

Very closely related to *N. fusca*, but, I think, sufficiently distinct in the smaller and narrower leaves which in the typical form are distinctly apiculate and either quite entire or very minutely crenulate, and in the smaller and narrower involucres. Var. *dubia* was placed under *N. fusca* by Kirk, and it certainly approaches var. *Colensoi* of that species; but, on the whole, appears to be nearer to *N. apiculata.*

4. **N. Blairii** *Cockayne in Trans. N.Z. Inst.* xliii (1911) 172.—A tall tree 40–60 ft. high; trunk 2–3 ft. diam.; branchlets and petioles pubescent. Leaves petiolate, spreading, $\frac{2}{3}$–$\frac{3}{4}$ in. long, $\frac{1}{3}$–$\frac{1}{2}$ in. broad, ovate, acute or apiculate, rounded at the base, quite entire, coriaceous, glabrous above, beneath clothed with fulvous appressed tomentum. Male flowers 2–3 at end of a short common peduncle. Perianth cup-shaped, 4–5-toothed. Stamens 8–15. Fruiting-involucre $\frac{1}{4}$–$\frac{1}{3}$ in. long, ovoid, glabrous, 4-lobed;

lobes with 3–4 membranous transverse lamellae. Nuts 3-winged, broad at the base, narrowed above.—Fagus Blairii *T. Kirk in Trans. N.Z. Inst.* xvii (1885) 297; *Forest Fl.* (1889) t. 57; *Cheesem. Man. N.Z. Fl.* (1906) 642.

North Island: Forests near the sources of the Wanganui River, *T. Kirk!* lower part of Waimarino Plateau, *T. F. C.* South Island: Marlborough—Mount Fyffe, *W. M. Goodall (fide Cockayne).* Nelson—Wairau Valley, Buller Valley, Little Grey River, *T. Kirk.* Otago—Five-fingers Plain, *W. N. Blair;* Lake Wakatipu and valley of the Dart, *T. Kirk.* Not uncommon in western Otago, Lake Te Anau, Lake Manapouri, &c., *H. J. Matthews!* Martin's Bay, *Buchanan.*

Differs from *N. Solandri* in the broader ovate apiculate leaves, fulvous pubescence, and 4-valved fruiting-involucre. Some specimens without flower or fruit, collected by Petrie near Arrowtown, Otago, agree with *F. Blairii* in the thick fulvous pubescence on the under-surface of the leaves, but the leaves are more oblong and obscurely toothed or sinuate, much as in *F. apiculata* var. *dubia.*

5. **N. Solandri** (*Solanderi*) *Oerst. in Vidensk. Selsk. Skr.* v, ix (1873) 355.—A lofty forest-tree 40–80 ft. high; trunk 2–5 ft. diam.; bark black and furrowed on old trees, pale and smooth on young ones; branchlets closely pubescent. Leaves evergreen, shortly petiolate, $\frac{1}{4}$–$\frac{3}{4}$ in. long, linear-oblong to elliptic-oblong, obtuse, cuneate and usually unequal-sided at the base, quite entire, coriaceous, glabrous and reticulated above, clothed with appressed greyish-white pubescence beneath, margins recurved; stipules membranous, caducous. Male flowers axillary, either solitary or 2–3 on a short common peduncle. Perianth broad and shallow, cup-shaped, shortly 4–5-toothed. Stamens 8–15. Female involucres solitary in the upper axils, sessile, 2–3-flowered. Fruiting-involucres $\frac{1}{4}$ in. long, ovoid, glabrous or pubescent, usually 3-lobed; lobes with three membranous transverse lamellae. Nuts 2–3-winged, broad at the base, narrowed above.—Fagus Solandri *Hook f. in Hook. Ic. Plant.* (1844) t. 639; *Raoul Choix* (1846) 42; *Hook f. Fl. Nov. Zel.* i (1853) 230; *Handb. N.Z. Fl.* (1864) 250; *T. Kirk Forest Fl.* (1889) t. 56; *Cheesem. Man. N.Z. Fl.* (1906) 643.

North and South Islands: Forests from the East Cape to the south of Otago, usually in hilly or mountain districts. Sea-level to 2500 ft. *Tawhai; Tawhai-rauriki; Black-beech.* November–December.

Wood pale-red, often streaked with black, not durable unless taken from fully mature trees. Young trees often have the leaves distichously arranged, with the under-surface glabrous or nearly so.

6. **N. cliffortioides** *Oerst. in Vidensk. Selsk. Skr.* v, ix (1873) 355.—A small tree, usually from 20 to 40 ft. high, rarely more, with a trunk 1–2 ft. diam., in alpine localities often dwarfed into a much-branched bush 5–12 ft. high. Branches spreading, often distichous, especially in young trees; branchlets densely pubescent. Leaves shortly petiolate, distichous, $\frac{1}{6}$–$\frac{2}{3}$ in. long, ovate-oblong or ovate or ovate-orbicular, acute or subacute, rarely obtuse, always broadest at the unequally rounded or almost cordate base, quite entire, very coriaceous, glabrous and reticulated above, more or less clothed with greyish-white appressed hairs beneath; margins thickened, often recurved; stipules membranous, caducous. Male flowers axillary, solitary or in pairs on very short peduncles, often very abundantly produced. Perianth broad, cup-shaped, shortly 4–5-toothed. Stamens 8–15. Female involucres solitary and sessile in the upper axils, 2–3-flowered. Fruiting-involucres $\frac{1}{6}$–$\frac{1}{4}$ in. long, ovoid, pubescent, 3-lobed;

lobes with two or three transverse fringed lamellae. Nuts 2–3-winged, ovoid, acute.—*Cockayne Veg. N.Z.* (1921) t. 55, 56. Fagus cliffortioides *Hook. f. in Hook. Ic. Plant.* (1844) t. 673 *and* t. 816B; *Raoul Choix* (1846) 42; *Hook. f. Fl. Nov. Zel.* i (1853) 230; *Handb. N.Z. Fl.* (1864) 250; *T. Kirk Forest Fl.* (1889) tt. 101, 101A; *Cheesem. Man. N.Z. Fl.* (1906) 643.

North Island: Mountain districts from the East Cape and Tongariro southwards South Island: Abundant in the mountains throughout, usually forming the greater portion of the subalpine forests. Altitudinal range from 2000 ft. to 4500 ft., but descending to sea-level in one or two localities in Westland, and in the sounds on the south-west coast of Otago. *Tawhai-rauriki; Mountain-beech.* December–January.

Closely allied to *N. Solandri*, but much smaller, with the leaves truly ovate, broadest at the base, and usually acute at the tip. Wood very similar to that of *N. Solandri*.

Family XXVII. **MORACEAE.**

Trees or shrubs, rarely herbs; usually with milky sap. Leaves alternate, seldom opposite, stipules present. Flowers monoecious or dioecious, generally small and inconspicuous, arranged in heads, spikes, or catkins. Perianth 3–4-lobed or -partite; lobes valvate or imbricate. Stamens usually as many as the perianth-lobes; filaments inflexed in bud. Ovary almost always superior, 1-celled; ovule solitary, pendulous. Style terminal or subterminal. Fruit small, 1-seeded, dry or rarely succulent.

As defined in the "Pflanzenfamilien," this is a family of 50 or 60 genera, probably containing 850 species, most of which are tropical. It includes quite a large number of useful plants, only a few of which can be mentioned here. Of edible species, the fig, mulberry, and bread-fruit are the most important. Of fibre-plants, the common hemp and the paper-mulberry are well-known species. Several species of *Ficus*, and notably *F. elastica*, yield indiarubber. *Ficus indica* is the well-known banyan. The upas-tree (*Antiaris toxicaria*) is highly poisonous. The single New Zealand genus is also found in eastern Polynesia.

1. **PARATROPHIS** Blume. 1852.

Trees with milky juice. Leaves alternate, shortly petiolate, crenate or almost entire, penninerved; stipules small, lateral, caducous. Flowers dioecious, in axillary or rarely terminal solitary or geminate spikes. Male flowers: Numerous, usually closely placed. Perianth small, 4-partite; segments broad, obtuse, concave, imbricate. Stamens 4; filaments inflexed in bud; anthers didymous, 2-celled. Rudimentary ovary turbinate. Female flowers: Few and lax, or numerous and dense. Perianth very small, 4-partite; segments unequal, closely imbricate. Ovary straight, sessile, exserted, 1-celled; style deeply 2-partite; ovule solitary, pendulous. Fruit drupaceous, seated on the slightly enlarged persistent perianth, globose or ovoid, tipped by the short style; exocarp thin, fleshy; endocarp crustaceous. Seed subglobose; albumen scanty; cotyledons broad, foliaceous, conduplicate.

A small genus of 10 species, 3 of which are found in New Zealand, 5 in the Pacific islands, and 2 in the Philippines.

Leaves $\frac{1}{3}$–$1\frac{1}{2}$ in. Female spikes $\frac{1}{4}$–$\frac{1}{2}$ in., 3–8-flowered. Drupes 1–3 ripening on each spike, $\frac{1}{6}$ in. diam.	1. *P. microphylla.*
Leaves $1\frac{1}{2}$–$3\frac{1}{2}$ in. Female spikes $\frac{1}{2}$–1 in., 8–25-flowered. Drupes usually many ripening on each spike, $\frac{1}{4}$ in. diam.	2. *P. opaca.*
Leaves 4–8 in., entire. Female spikes 2–4 in., many-flowered; flowers in 2 rows on each side of the rhachis. Drupe $\frac{1}{3}$ in. diam.	3. *P. Smithii.*

× P. microphylla/opaca allan, Genetica 1925. 7:290

(Raoul) Bruce 1916 or 17 : 639 ?

1. **P. microphylla** /*Cockayne Veg. N.Z.* (1921) 355.—A tree 15–40 ft. high, with a trunk 9–24 in. diam.; bark grey or almost white, rough with raised lenticels; branches numerous, crowded, glabrous or pubescent; those of young plants long and slender, flexuous, often interlaced, pubescent or setose at the tips, bark dark-brown. Leaves of young plant remote, $\frac{1}{3}$–$\frac{3}{4}$ in. long, broadly obovate to oblong-obovate, acute or obtuse, cuneate at the base, rather membranous, glabrous or pubescent, serrate, often irregularly lobed or almost pinnatifid; of mature trees $\frac{1}{3}$–$1\frac{1}{2}$ in. long, oblong-ovate or oblong-obovate to elliptic, obtuse or acute, crenate or crenate-dentate, coriaceous, dark-green, prominently reticulate. Male spikes $\frac{1}{3}$–1 in. long, shortly pedunculate, cylindric. Flowers closely packed, minute, sessile, intermixed with peltate scales. Perianth-segments rounded, margins ciliate. Stamens exserted. Female spikes $\frac{1}{4}$–$\frac{1}{2}$ in. long, 3–8-flowered. Flowers lax, very minute, intermixed with peltate scales. Perianth-segments appressed to the ovary, the 2 outer rather smaller. Drupe globose, small, red, $\frac{1}{6}$ in. diam., usually 1 and seldom as many as 3 ripening on each spike.—P. heterophylla *Blume Mus. Bot. Lugd. Bat.* ii (1852) 81; *Cheesem. Man. N.Z. Fl.* (1906) 632; *Ill. N.Z. Fl.* ii (1914) t. 180. Epicarpurus microphyllus *Raoul Choix* (1846) 14, t. 9; *Hook. f. Handb. N.Z. Fl.* (1864) 251. Trophis opaca *Hook. f. Fl. Nov. Zel.* i (1853) 224 (*in part*). Taxotrophis microphylla *F. Muell. Fragm. Phyt. Austral.* vi (1868) 193.

North and South Islands: Not uncommon in lowland forests throughout. *Turepo; Milk-tree.* October–February.

Abounding in milky sap, which is said to be palatable. The wood is dense and heavy, but not durable. The spikes are often diseased, and converted into large much-branched panicles densely clothed with small imbricating bracts, the flowers being altogether aborted.

(B.+S. ex Hook.f.)

2. **P. opaca**/*Britton and Rendle in Journ. Bot.* (1907) 74.—A small tree 15–25 ft. high, glabrous or the young branches pubescent; bark brown. Leaves usually close-set, spreading, $1\frac{1}{2}$–$3\frac{1}{2}$ in. long, ovate-oblong or elliptic-oblong, obtuse or acute, coriaceous, glabrous, obtusely crenate or crenate-dentate, veins finely reticulate. Spikes solitary or geminate or rarely 3 together, axillary, rarely terminal, pedunculate. Males 1–2 in. long, cylindrical, densely many-flowered; flowers intermixed with peltate scales. Perianth rather larger than in *P. heterophylla.* Female spikes $\frac{1}{2}$–1 in. long; flowers 8–25 or more, distichous, rhachis compressed. Drupe broadly ovoid, red, $\frac{1}{4}$ in. diam., always several and often many ripening on each spike.—P. Banksii *Cheesem. Man. N.Z. Fl.* (1906) 633. P. heterophylla *var.* elliptica *T. Kirk in Trans. N.Z. Inst.* xxix (1897) 500, t. 46. Trophis opaca *Banks and Sol. ex Hook. f. Fl. Nov. Zel.* i (1853) 224 (*in part*).

See Bruce 1916 p. 639.

North Island: Usually near the sea. Bay of Islands, *Colenso!* Whangarei Heads and Hen and Chicken Islands, *T. F. C.;* Great Barrier Island, Omaha, *T. Kirk!* Cuvier Island, *T. F. C.;* Mayor Island, *Dr. Thilenius;* Cabbage Bay, *Adams!* East Cape district, *Banks* and *Solander, Bishop Williams! Petrie!* Cook Strait, *T. Kirk!* Wainuiomata to Orongorongo, Cook Strait, *B. C. Aston!* Stephen Island, *H. H. Travers!* South Island: Motuaro Island (Queen Charlotte Sound), *Banks* and *Solander! J. H. Macmahon!*

This is separated from *P. microphylla* by the much larger leaves, longer spikes, more numerous female flowers, and much larger and more numerous drupes; and in its extreme form has a very distinct appearance. Intermediate states, however, are by no means uncommon.

3. **P. Smithii** *Cheesem. in Trans. N.Z. Inst.* xx (1888) 148.—A perfectly glabrous shrub or small tree 6–15 ft. high, with copious milky juice; branches long, slender, straggling, often flexuous and interlaced; bark dark-brown, rough with raised lenticels. Leaves 4–8 in. long, ovate-oblong or elliptic-oblong, obtuse or obtusely acuminate, rounded or obliquely cordate at the base, quite entire, dark-green, coriaceous; veins conspicuous, reticulated; stipules lanceolate, caducous. Spikes solitary or geminate, axillary or from the branches below the leaves, 2–5 in. long. Males cylindric, densely many-flowered; flowers intermixed with peltate scales. Perianth $\frac{1}{8}$ in. diam.; segments rounded, spreading, pubescent externally. Females many-flowered, the flowers minute, densely packed in 2 irregular rows on each side of the flattened rhachis, intermixed with peltate scales. Perianth-segments rounded, obtuse, closely appressed to the ovary, the 2 outer rather smaller than the others. Ovary conic, exserted. Style deeply 2-partite. Drupe globose, bright-red, $\frac{1}{3}$ in. diam.—*Man. N.Z. Fl.* (1906) 633.

North Island: Three Kings Islands, abundant, *T. F. C.*

Easily recognized by the large entire leaves and long many-flowered female spikes, with the flowers distichously arranged in 2 rows on each side of the rhachis.

Family XXVIII. **URTICACEAE.**

Herbs, shrubs, or trees, of very diversified habit and foliage; sap watery, very rarely milky. Leaves alternate or opposite, entire or toothed or more rarely divided; stipules present. Flowers unisexual, small and inconspicuous, cymose or fascicled or capitate, sometimes crowded on a variously shaped receptacle with or without an involucre. Perianth simple, herbaceous, of 4–5 equal or unequal lobes or segments, imbricate or valvate in bud, in the female flowers often smaller and with fewer segments, rarely absent. Stamens equal and opposite to the segments; filaments often inflexed in bud, uncoiling elastically when the flower opens; anthers 2-celled, dehiscing longitudinally. Ovary superior or rarely inferior, 1-celled; style terminal or lateral; ovule solitary. Fruit dry or fleshy, naked or enclosed in or adnate to the somewhat accrescent perianth. Seed erect; albumen present or very rarely wanting. Embryo straight, axile; radicle superior.

A family of about 45 genera and 500 species, the great majority of which are purely tropical. With the exception of a few fibre-plants like the Rhea (*Boehmeria nivea*) the family contains few species of economic value. Of the 5 indigenous genera, *Urtica* and *Parietaria* are widely spread in most temperate and tropical countries; *Elatostema* and *Boehmeria* are mainly tropical; while *Australina* is found in Australia and South Africa.

Herbs with stinging hairs. Leaves opposite. Female perianth 4-partite	1. Urtica.
Herbs. Leaves alternate. Flowers crowded on a fleshy discoid receptacle	2. Elatostema.
Trees. Leaves 3-nerved. Female perianth tubular, enclosing the fruit	3. Boehmeria.
Herbs, without stinging hairs. Leaves alternate. Flowers in involucrate clusters. Female perianth tubular. Stigma tufted	4. Parietaria.
Herbs, without stinging hairs. Leaves alternate. Flowers not involucrate. Female perianth tubular. Stigma linear	5. Australina.

1. **URTICA** Linn. 1735 Syst-1

Annual or perennial herbs or small shrubs, more or less armed with stinging hairs. Leaves opposite, petiolate, toothed or lobed, 3–7-nerved; stipules lateral, free or connate. Flowers small, green, monoecious or dioecious, in clusters arranged in axillary simple or branched racemes or panicles. Male flowers: Perianth deeply 4-partite; segments ovate or rounded, concave. Stamens 4, inflexed in bud. Rudimentary ovary cupuliform. Female flowers: Perianth deeply 4-partite; the 2 outer segments smaller than the inner. Ovary straight, ovoid; stigma sessile or nearly so, penicillate; ovule solitary, erect, orthotropous. Achene ovoid or oblong, compressed, enclosed in the persistent perianth. Seed erect; albumen scanty; cotyledons rounded.

Species 30 to 35, widely spread in the temperate and subtropical regions of both hemispheres, rarer in the tropics. One of the New Zealand species extends to Australia, the remaining three are endemic.

Shrubby, 3–10 ft. high. Stinging hairs copious, long, rigid. Leaves 2–5 in., narrow ovate-triangular to lanceolate	1. *U. ferox.*
Herbaceous, stout, 1–3 ft. high, glabrous or nearly so. Stinging hairs few, weak. Leaves 3–6 in., ovate- or orbicular-cordate ..	2. *U. australis.*
Herbaceous, stout, 1 ft. high, pubescent with greyish-white hairs. Leaves 2–3 in., broadly ovate	3. *U. aucklandica.*
Dioecious, stout, subcoriaceous, everywhere clothed with copious stinging hairs. Leaves broad	4. *U. aspera.*
Monoecious, slender, thin; stinging hairs few. Leaves broad ..	5. *U. incisa.*
Tall, slender, stems often flexuous. Leaves linear or linear-lanceolate	6. *U. linearifolia.*

1. **U. ferox** *Forst. f. Prodr.* (1786) n. 346.—A slender much-branched shrub, sometimes 6–10 ft. high with a woody trunk 3–4 in. diam. at the base, but usually from 2 to 5 ft.; stinging hairs copious, long, rigid, $\frac{1}{6}$–$\frac{1}{4}$ in. long; branchlets, petioles, and under-surface of leaves more or less finely pubescent. Leaves on long slender petioles; blade 2–5 in. long, narrow ovate-triangular to lanceolate-triangular, acuminate, broadest at the base which is truncate or rounded or cordate and often lobed or hastate, thin and membranous; margins deeply and coarsely toothed, the teeth ending in a long rigid bristle; stipules interpetiolar, entire. Flowers dioecious, in axillary racemiform panicles 1–2 in. long. Perianth densely pubescent, females smaller than the males. Nut ovoid, compressed, about $\frac{1}{20}$ in. long.—*A. Rich. Fl. Nouv. Zel.* (1832) 354; *A. Cunn. Precur.* (1838) n. 333; *Raoul Choix* (1846) 42; *Hook. f. Fl. Nov. Zel.* i (1853) 225; *Handb. N.Z. Fl.* (1864) 251; *Cheesem. Man. N.Z. Fl.* (1906) 634.

North and South Islands: Ngamahanga, near Kawakawa, Bay of Islands, *T. H. Trevor!* Marokopa, *E. Phillips Turner!* Ongarue, *T. F. C.;* Taumarunui, *Cockayne;* Makatote, *H. B. Matthews!* Patetere Range, south of Te Aroha, *Downard!* Paeroa Range, near Waiotapu, *A. Allison!* East Cape and Kawhia southwards to eastern Otago, not common. *Tree-nettle; Ongaonga.* Sea-level to 2000 ft.

A very distinct species, easily recognized by the large size, woody stems, and copious stipitate stinging hairs.

2. **U. australis** *Hook. f. Fl. Antarct.* i (1844) 68.—Stems 1–3 ft. high, erect or decumbent at the base, stout, succulent, glabrous or sparingly clothed with short white hairs; stinging hairs few, weak, chiefly clustered at the nodes. Leaves opposite, the upper sometimes ternate; blade 3–6 in. long or even more, broadly ovate- or orbicular-cordate, acute, coarsely toothed or crenate, rather fleshy, 5–7-nerved, glabrous or sparsely pubescent

or setose; petiole stout, 1–4 in. long; stipules interpetiolar, large, bifid. Racemes or panicles simple or branched, axillary, longer or shorter than the petioles, the lower male and the upper female, but both sexes occasionally mixed in the same panicle. Male perianth about $\frac{1}{12}$ in. diam., glabrous or nearly so; female rather smaller. Nut ovoid, compressed, smooth, rather shorter than the persistent perianth.—*Fl. Nov. Zel.* i (1853) 225; *Handb. N.Z. Fl.* (1864) 251; *Cheesem. Man. N.Z. Fl.* (1906) 635.

North Island: "Southern extreme, *Bidwill*" (Handbook). Chatham Islands: *H. H. Travers! F. A. D. Cox* and *Cockayne!* Stewart Island: Not seen on the main island, but not uncommon on Dog Island, Centre Island, *T. Kirk!* and Long Island, *Poppelwell!* and probably other islets in Foveaux Strait. Auckland, Campbell, and Antipodes Islands: *Hooker, T. Kirk, Cockayne, B. C. Aston! R. M. Laing! J. S. Tennant.* December–March.

Remarkable for its stout succulent habit and large leaves. Although reported from the North Island in the Handbook, on the authority of Bidwill, of late years no New Zealand botanist has met with it on any part of the mainland of either the North or South Island.

3. **U. aucklandica** *Hook. f. Fl. Antarct.* i (1844) 68.—A rigid herb, everywhere pubescent with short greyish-white hairs. Stems stout, erect, angled, about 1 ft. high; stinging hairs few, chiefly clustered at the thickened nodes. Leaves opposite, spreading, 2–3 in. long, $1\frac{1}{2}$–$2\frac{1}{2}$ in. broad, broadly ovate, acute, usually cordate at the base, rather coriaceous, many-nerved, coarsely serrate or dentate; petioles stout, $\frac{1}{2}$–1 in. long; stipules rather large, interpetiolar, 2-fid or 2-partite. Male flowers alone seen, in short axillary spikes. Perianth-segments 4, rounded, concave, setose on the back. Stamens 4; filaments short.—*Handb. N.Z. Fl.* (1864) 251; *Cheesem. Man. N.Z. Fl.* (1906) 635.

Auckland Islands: Near the sea-beach at the margin of woods, rare, *Hooker.*

I have seen no specimens of this, and the above description has been compiled from that given in the "Flora Antarctica." It appears to be very close to *U. australis*, differing chiefly in the smaller size and more rigid habit, and in the dense greyish-white pubescence. As it has not been gathered by any one since its original discovery by Hooker in 1840, and as his specimens were immature and imperfect, it may be safely regarded as a state of *U. australis.*

4. **U. aspera** *Petrie in Trans. N.Z. Inst.* li (1919) 107.—Rather stout, erect or decumbent at the base, much branched, 1–$1\frac{1}{2}$ ft. high, densely clothed in all its parts with stiff white stinging hairs. Leaves opposite, variable in size and shape; petioles stout, often exceeding the blades in length; blades $1\frac{1}{2}$–$2\frac{1}{2}$ in. long, $\frac{3}{4}$–$1\frac{1}{2}$ in. broad, ovate or ovate-triangular, coarsely and sometimes deeply serrate, acute, subcoriaceous; stinging hairs plentiful on most of the main veins. Inflorescence dioecious; male spikes geminate or single in the upper axils, rather long; the flowers arranged in small distant glomerules; female spikes simple or branched; flowers numerous, crowded. Nuts broadly ovoid; fruiting-perianth not enlarged.

South Island: Marlborough—Head of Awatere Valley, *Cockayne!* Dee Valley, Clarence basin, *B. C. Aston!* Otago—Firewood Creek, near Cromwell; Sowburn, Maniototo County, *Petrie;* vicinity of Clyde, *Cockayne,* abundant. 1500–3000 ft.

Very close to *U. incisa*, but stouter and more coriaceous; with all its parts, including the inflorescence, densely covered with stinging hairs. The flowers are dioecious, whereas they are monoecious in *U. incisa.* Dr. Cockayne informs me that it has long underground stems and that by their aid it is rapidly spreading in certain parts of Central Otago.

5. **U. incisa** *Poir. Encycl. Suppl.* iv (1817) 224.—Stems slender, erect or decumbent at the base, much or sparingly branched or simple, sparsely clothed with weak stinging hairs but otherwise glabrous, 1–2 ft. high, rarely more. Leaves on long slender petioles, very variable in size and shape; blade ½–2½ in. long, broadly ovate-deltoid to lanceolate, acute or acuminate, cordate or truncate or cuneate at the base, deeply and acutely toothed, membranous; stinging hairs few, weak. Spikes or racemes single or geminate in the axils of the upper leaves, often branched, longer or shorter than the petioles, the lower male and the upper female, or inflorescence altogether monoecious. Male perianth $\frac{1}{15}$ in. diam., glabrous or nearly so; female perianth much smaller when in flower but enlarging as the fruit ripens. Nut ovoid, compressed, rather longer than the persistent slightly enlarged perianth.—*Hook. f. Handb. N.Z. Fl.* (1864) 251; *Benth. Fl. Austral.* vi (1873) 190; *Cheesem. Man. N.Z. Fl.* (1906) 635. U. lucifuga *Hook. f. in Hook. Lond. Journ. Bot.* vi (1847) 285; *Fl. Nov. Zel.* i (1853) 225.

North and South Islands: Not uncommon in shaded places, from the North Cape to Foveaux Strait. Sea-level to 4000 ft. Flowers spring and summer.

Also common in Australia and Tasmania, and very near to the northern *U. dioica* (which is sparingly naturalized in New Zealand), principally differing in the more slender habit, in not being conspicuously pubescent between the stinging hairs, and in the usually shorter spikes.

6. **U. linearifolia** *Cockayne in Trans. N.Z. Inst.* xlvii (1915) 111.—Stems weak, slender, erect or flexuose, much or sparingly branched, more or less clothed with weak stinging hairs but otherwise glabrous, 1–3 ft. high. Leaves on slender petioles, variable in size and shape, but always much narrower than those of *U. incisa;* blade ½–4 in. long, ⅛–½ in. wide, lanceolate to linear-lanceolate or linear, coarsely or finely toothed, usually cuneate at the base. Spikes much shorter than those of *U. incisa,* often reduced to axillary glomerules. Inflorescence much as in *U. incisa,* but flowers smaller. Nuts brown, ovoid, persistent after the perianth has fallen.—U. lucifuga *var.* linearifolia *Hook. f. Fl. Nov. Zel.* i (1853) 225. U. incisa *var.* linearifolia *Cheesem. Man. N.Z. Fl.* (1906) 636.

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North Island: Lake Papaitonga, near Levin, *B. C. Aston;* Makurerua Swamp, *Cockayne.* South Island: Clarence Valley, *T. F. C.;* various localities in eastern Otago, *Petrie!* Humboldt Mountains, *Cockayne.* Sea-level to 4000 ft. December–February.

2. **ELATOSTEMA** Forst. 1776. nom. cons.

Herbs, sometimes woody at the base. Leaves distichous, alternate, or if opposite one of each pair much smaller than the other, sessile or nearly so, oblique and unequal-sided; stipules lateral or intrapetiolar. Flowers very minute, densely crowded in axillary sessile or peduncled unisexual usually involucrate receptacles; involucral bracts broadly oblong or ovate, nearly free or confluent below. Male flowers: Perianth 4–5-partite; segments membranous or hyaline, often spurred or tubercled on the back. Stamens 4–5, inflexed in bud. Rudimentary ovary minute. Female flowers: Perianth of 3–5 very minute segments or altogether wanting. Stamens imperfect. Ovary straight; stigma sessile, penicillate; ovule erect. Achene minute, compressed, ovoid or ellipsoid, smooth or rarely ribbed. Seed erect; albumen usually wanting; cotyledons ovate.

About 80 species are known, for the most part natives of tropical Asia and Africa, but the genus extends northwards to Japan, and southwards to New Zealand.

1. **E. rugosum** *A. Cunn. Precur.* (1838) n. 335.—Stems stout, succulent, decumbent or prostrate and rooting at the base, erect above, sparingly branched, 1–5 ft. high. Leaves alternate, 4–10 in. long, obovate-lanceolate or lanceolate, acuminate, curved, unequal-sided, auricled and semi-amplexicaul at the sessile base, sharply serrate, membranous, rugose, pubescent with minute rigid hairs on both surfaces; stipules lanceolate, membranous, deciduous. Receptacles monoecious, solitary in the axils of the leaves, sessile or shortly pedunculate, depressed-hemispherical, often lobed, $\frac{1}{4}$–$\frac{1}{2}$ in. diam. Males: Bracts broad, glabrous or puberulous. Flowers very numerous, pedicelled, hidden among the broad membranous bracteoles. Perianth 4-partite; segments abruptly acuminate, hyaline. Females with the bracts narrower and more pubescent. Bracteoles linear-spathulate, ciliate. Flowers almost sessile; perianth very minute, of 4 hyaline segments. Stigma penicillate. Achene minute, ovoid, smooth.—*Raoul Choix* (1846) 42; *Hook. f. Fl. Nov. Zel.* i (1853) 227; *Handb. N.Z. Fl.* (1864) 253; *Cheesem. Man. N.Z. Fl.* (1906) 636.

North Island: Damp shaded ravines from the North Cape southwards to the middle of Wellington Province, but local to the south of the Waikato River. Sea-level to 2000 ft. *Parataniwha.* Flowers spring and summer.

The heads or receptacles are usually described as unisexual, but it is not uncommon to find both sexes mixed in the same head.

3. **BOEHMERIA** Jacq. 1760.

Shrubs or small trees. Leaves alternate or opposite, toothed, 3-nerved; stipules usually free, deciduous. Flowers monoecious or dioecious, in small globose glomerules; glomerules axillary, either solitary or spiked or racemed or panicled. Male flowers: Perianth 3–5-lobed or -partite; segments valvate. Stamens 3–5, inflexed in bud. Rudimentary ovary clavate or globose. Female flowers: Perianth tubular, compressed or ventricose, mouth often contracted, 2–4-toothed. Ovary included, sessile or stipitate; stigma filiform, persistent; ovule solitary, erect. Achene closely invested by the persistent perianth, crustaceous. Seed albuminous; cotyledons ovate or elliptic.

Species about 60, widely spread through the tropics of both hemispheres.

1. **B. dealbata** *Cheesem. in Trans. N.Z. Inst.* xxiv (1892) 410.—A small tree 8–25 ft. high; branches terete, pubescent with minute appressed hairs. Leaves alternate, 3–6 in. long, ovate or ovate-lanceolate, acuminate, rounded at the base, rarely slightly cordate, obtusely serrate, prominently 3-nerved and with the secondary veins also strongly marked, green and glabrous and rugulose above, white and hoary beneath; petioles stout, $\frac{3}{4}$–2 in. long, grooved on the upper surface. Flowers minute, in small axillary sessile glomerules, which are either unisexual or androgynous. Male flowers: Perianth deeply 4-partite; segments oblong-ovate, acuminate, clothed with erect hairs. Stamens exserted. Females: Perianth tubular, dilated below, contracted at the 2-toothed mouth. Stigma exserted, long, filiform, hirsute. Fruiting-perianth much compressed, broadly winged. Achene very minute, ovoid, quite smooth.—*Man. N.Z. Fl.* (1906) 637; *Ill. N.Z. Fl.* ii (1914) t. 181.

Kermadec Islands: Sunday Island, not uncommon at low elevations, *T. F. C., W. R. B. Oliver!* Flowers most of the year.

Nearly intermediate in characters between the Norfolk Island *B. australis* and the Lord Howe Island *B. calophleba,* but apparently distinct from both.

Skottsb. Die Flora der Osterinseln 1937: 9.

4. **PARIETARIA** [Tourn.] Linn 1735.

Annual or perennial herbs. Leaves alternate, petiolate, quite entire, 3-nerved; stipules wanting. Flowers polygamous, in axillary cymes or glomerules, sessile, bracteate. Male flowers (often hermaphrodite): Perianth deeply 3–4-partite; segments valvate. Stamens 3–4, inflexed in bud. Female flowers: Perianth tubular at the base, 3–4-lobed. Ovary free within the perianth; stigma recurved, penicillate; ovule solitary, erect. Achene enclosed in the variously enlarged persistent perianth, crustaceous. Seed albuminous; cotyledons oblong or ovate.

A small genus of 7 or 8 species, generally distributed in both temperate and tropical regions. The single New Zealand species has almost the range of the genus.

1. **P. debilis** *Forst. f. Prodr.* (1786) n. 387.—A slender flaccid more or less pubescent diffusely branched annual herb 6–18 in. high. Leaves on long slender petioles; blade $\frac{1}{2}$–$1\frac{1}{2}$ in. long, broadly ovate or ovate-cordate, obtuse or obtusely acuminate, thin and membranous, quite entire, green on both surfaces, 3-nerved from the base. Cymes 3–7-flowered, almost contracted into sessile clusters; bracts linear, shortly united at the base. Hermaphrodite (or male) flowers usually in the fork of the cyme; perianth almost unchanged in fruit. Females flowers lateral; perianth evidently enlarged in fruit. Achene very minute, dark-brown, quite smooth.—*A. Rich. Fl. Nouv. Zel.* (1832) 354; *Hook. f. Fl. Nov. Zel.* i (1853) 226; *Handb. N.Z. Fl.* (1864) 252; *Benth. Fl. Austral.* vi (1873) 188; *Cheesem. Man. N.Z. Fl.* (1906) 638. Urtica debilis *Endl. Prodr. Fl. Insl. Norfl.* (1833) 37; *A. Cunn. Precur.* (1836) n. 334; *Raoul Choix* (1846) 42.

Kermadec Islands, North and South Islands: Abundant as far south as middle Otago. Sea-level to 2500 ft. Flowers spring and summer.

5. **AUSTRALINA** Gaud. 1826 in Freyc. Voy. Bot. 575.

Diffuse or creeping annual or perennial herbs. Leaves alternate, petiolate, crenate-toothed or almost entire; stipules lateral, free. Flowers monoecious, in few-flowered axillary glomerules; glomerules unisexual or androgynous. Male flowers: 1–5 together at the summit of a common peduncle. Perianth irregularly bilabiate, the outer lip inflexed in bud. Stamen solitary. Rudimentary ovary wanting. Female flowers solitary or few together, sessile. Perianth ovoid-tubular, mouth contracted and obscurely toothed. Ovary free within the perianth; stigma linear, villous; ovule erect from the base. Achene enclosed in the persistent perianth; pericarp thin, shining. Seed with scanty albumen; cotyledons ovate.

A small genus of 6 species, 2 found in Australia, 1 of them extending to New Zealand, and 4 natives of South Africa and Abyssinia.

1. **A. pusilla** *Gaud. in Freyc. Voy. Bot.* (1826) 505.—Stems very slender, creeping and rooting, much and often intricately branched, 3–12 in. long, more or less pubescent. Leaves $\frac{1}{6}$–$\frac{1}{2}$ in. long, broadly ovate or orbicular or broader than long, rounded at the tip, cuneate or almost truncate at the base, obtusely crenate, thin and membranous, pubescent on both surfaces; petiole as long or longer than the blade. Male flowers 2–3 together or solitary; peduncle variable in length, sometimes exceeding the petiole. Perianth irregularly bilabiate, green, membranous, hispid. Stamen large,

exserted. Female flowers solitary or 2–3 together, each on a very short peduncle or sessile, in the same or in a different axil to the male inflorescence. Perianth very minute, flask-shaped, 2–3-toothed at the constricted mouth. Style exserted, villous.—*Hook. f. Handb. N.Z. Fl.* (1864) 252; *Benth. Fl. Austral.* vi (1873) 189; *Cheesem. Man. N.Z. Fl.* (1906) 639. A. novae-zealandiae *Hook. f. Fl. Nov. Zel.* i (1853) 226. A. hispidula *Col. in Trans. N.Z. Inst.* xviii (1886) 266.

North and South Islands: Dark shaded woods from Hokianga and the Bay of Islands to Foveaux Strait, but often very local. Sea-level to 1000 ft.

Family XXIX. **PROTEACEAE.**

Shrubs or trees, rarely herbs. Leaves usually alternate, very rarely opposite or whorled, generally hard and coriaceous, entire or toothed or variously divided; stipules wanting. Flowers usually hermaphrodite, inflorescence various. Perianth inferior, regular or irregular; segments 4, valvate, at first cohering into a cylindric tube, at length separating and becoming revolute. Stamens 4, inserted on the perianth-segments and opposite to them; filaments short; anthers erect, adnate, 2-celled, introrse. Hypogynous glands 4, alternating with the stamens. Ovary superior, 1-celled, often oblique; style terminal, variously thickened and enlarged at the top; stigma terminal or lateral; ovules solitary or geminate or many. Fruit either an indehiscent nut or drupe, or a dehiscent coriaceous or woody follicle, more rarely a 2-valved capsule. Seeds exalbuminous; embryo straight, with fleshy cotyledons, radicle inferior.

A large and well-marked family, chiefly found in Australia and South Africa, but extending to the Pacific islands and tropical Asia on the one side and South America on the other; absent in Europe, North Asia, and North America. Genera about 50; species estimated at 950. Several species are cultivated for ornamental purposes, but few possess any useful properties. Of the two indigenous genera, *Knightia* has two species in New Caledonia, while *Persoonia* is largely developed in Australia. The meagre representation of the family in New Zealand, compared with its abundance in Australia, is a very curious and almost inexplicable feature of the flora.

Small spreading tree. Leaves entire. Fruit fleshy .. .. 1. Persoonia.
Tall fastigiate tree. Leaves serrate. Fruit a woody follicle .. 2. Knightia.

1. **PERSOONIA** Smith. 1795. Tr. Linn Soc. 4: 215.

Shrubs or small trees. Leaves entire, alternate or sometimes almost whorled. Flowers small, hermaphrodite, yellowish or white, solitary and axillary, or in axillary or terminal racemes. Perianth regular, constricted above the base or cylindrical; segments ultimately separating to the base or nearly so, upper portion revolute. Stamens affixed at or below the middle of the perianth-segments; filaments short; anthers usually all perfect, oblong or linear. Hypogynous scales 4, small. Ovary stipitate; style short and thick, or elongated and filiform; stigma terminal; ovules 2 or rarely 1, orthotropous, pendulous from the top of the cell. Fruit a drupe, either 1-celled and 1-seeded, or obliquely 2-celled and 2-seeded; exocarp more or less succulent; endocarp thick and hard.

Species about 60, all confined to Australia except the present one, which is endemic in the North Island of New Zealand.

1. **P. Toru** *A. Cunn. in Bot. Mag.* sub. t. 3513.—A handsome closely branched tree 15 to 30 or 40 ft. high; trunk 6–18 in. diam.; branchlets woody, terete, glabrous or the younger ones minutely puberulous. Leaves alternate, 4–8 in. long, narrow linear-lanceolate, acute or apiculate or rarely obtuse, gradually narrowed into a short petiole, quite entire, very thick and coriaceous, glabrous, smooth and polished on both surfaces, veins very obscure. Racemes axillary, strict, erect, 6–12-flowered, everywhere clothed with ferruginous pubescence. Perianth yellowish-brown, shortly pedicelled, $\frac{1}{4}$–$\frac{1}{3}$ in. long, pubescent externally. Ovary almost sessile, glabrous; style short, thick, not reaching the anthers; stigma oblique. Drupe oblong, reddish, $\frac{1}{2}$–$\frac{2}{3}$ in. long, 1- or 2-celled, with a single seed in each cell.—*Cheesem. Man. N.Z. Fl.* (1906) 605; *Ill. N.Z. Fl.* ii (1914) t. 170; P. Tora *A. Cunn. Precur.* (1838) n. 349; *Raoul Choix* (1846) 42. P. Toro *Hook. f. Fl. Nov. Zel.* i (1853) 219; *Handb. N.Z. Fl.* (1864) 241; *T. Kirk Forest Fl.* (1889) t. 74.

North Island: Not uncommon in woods from the North Cape to Rotorua and the East Cape. Sea-level to 2800 ft. *Toru*; *Toro*. October–November.

The specific name was given as "Toru" in Cunningham's original description in the "Botanical Magazine," and according to Mr. Colenso this is the proper spelling of the Maori name. It was, however, changed to "Tora" in Cunningham's subsequently published "Precursor," and was again altered to "Toro" by Sir J. D. Hooker. The wood is dark-red and prettily figured, and is occasionally used for inlaying and ornamental cabinetwork.

2. KNIGHTIA R. Br. 1810. nom. cons.

Trees or shrubs. Leaves alternate, coriaceous, coarsely toothed or entire. Flowers hermaphrodite, regular, arranged in axillary or terminal dense-flowered racemes; pedicels in pairs. Perianth cylindrical; the segments at first cohering by their margins, but ultimately separating and revolute to the base. Stamens affixed above the middle of the segments; filaments very short; anthers long, linear, acute. Hypogynous glands 4, distinct. Ovary sessile, 1-celled; style long, straight, linear-clavate; ovules 4. Follicles coriaceous, 1-celled, 4-seeded. Seeds winged at the top.

A small genus of 3 species, the typical one confined to New Zealand. The remaining 2 are natives of New Caledonia, and form the subgenus *Eucarpha*, characterized by the large deciduous bracts.

1. **K. excelsa** *R. Br. in Trans. Linn. Soc.* x (1810) 194, t. 2.—A tall slender tapering tree 60–90 ft. high, with the narrow fastigiate mode of growth of a Lombardy poplar; trunk 2–4 ft. diam.; bark dark-brown or almost black; branches erect, the younger ones angled and clothed with rusty brown pubescence. Leaves of mature trees 4–6 in. long, linear-oblong or narrow obovate-oblong, obtuse, coarsely and bluntly toothed, very coriaceous, hard, rigid, almost woody, pubescent when young, quite glabrous when old; leaves of young trees not so coriaceous, longer and narrower, 4–10 in. long, linear or linear-lanceolate, often acute, more acutely serrate. Racemes lateral, sessile, 2–4 in. long; peduncles and perianth densely clothed with bright red-brown velvety tomentum. Flowers in pairs on short pedicels, densly crowded, 1–1$\frac{1}{2}$ in. long. Perianth cylindric, swollen above; segments separating to the base and coiling up into a twisted mass. Ovary tomentose; style 1–1$\frac{1}{4}$ in. long, stout, erect, clavate

BROWN-- NEW POLYNESIAN PLAN. P.II. Dianella.
Occasional papers IX, 4.1930 2.

Dianella intermedia Endlicher var Norfolkensis new var.
"Leaves 50-100 cms. in length 12-18 ± mm. in width, obscurely spinulose -serrate to smooth along themargin and keel; flowers small; tepals 5mm. long, the outer series 5-veied, greenish-white to purplish in colour, not distinctly punctate; inter tepals somewhat broader, 3-veined with a wide hyaline border, nearly white in colour; anthers 2.5 ± mm. in length, commonly longer than the filaments; seed broadly oral, sub-acute, truncate at the base, 3.5 ± mm. long."
NEW ZEALAND, KAURI GULCH, near AUCKLAND, JANUARY 16th, 1921, F.B.H. BROWN, no. 162, reference type.

"Leaves obscurely serrulate t smooth, 60 ± cm. in length, 18± mm. in width; panicle of nearly the same height as the leaves; flowers small; tepals 5 mm. long, not distinctly punctate; outer tepals 5-veined, greenish in colour; inner tepals slightly wider 3-veined, nearly white, anthers 2.5 mm., nearly twice the length of the filaments; seed broadly ovate-elliptical in outline, obtuse to subacute at the apex, truncate or obtusely rounded at the base, 4 ± mm. in length, 2.5-3 mm. in width." FIJI, Lakemba, Sept.3rd, 1924. Edwin H. Bryan, Jr. no. 534 reference type.

The area of distribution includs Norfolk Is., Fiji at moderate altitudes, and N.Z. from sea-level o about 800 metres (Cheeseman; Manual of N.Z. Flora, p.320, 1925). Ntive names in N.Z. are pepe, piopio and turutu; in Fiji, vara.

Also a reference to Cypenis tenulus var. Australiensis

above. Follicles 1½ in. long, pubescent, tapering into the persistent style, ultimately splitting into 2 boat-shaped valves.—*A. Cunn. Precur.* (1838) n. 350 ; *Raoul Choix* (1846) 42 ; *Hook. f. Fl. Nov. Zel.* i (1853) 219 ; *T. Kirk Forest Fl.* (1889) t. 35 ; *Cheesem. Man. N.Z. Fl.* (1906) 606 ; *Ill. N.Z. Fl.* ii (1914) t. 171.

North Island : Common in woods throughout. South Island : Southern shores of Cook Strait, Croixelles Harbour, *T. Kirk ;* Pelorus Sound, *Buchanan, J. Rutland !* Sea-level to 2800 ft. *Honeysuckle ; Rewarewa.* November–December.

A tall handsome tree, easily distinguished by its fastigiate mode of growth. The wood is beautifully variegated, reddish on a light-brown ground, and is much used for inlaying and cabinetwork, ornamental turnery, &c. For an account of the fertilization of the flowers, see a paper by myself in vol. ii of the Journal of the Australasian Association. Mr. A. Allison sends me a curious sport in which the leaves are dichotomously forked.

Family XXX. **SANTALACEAE.**

Trees or shrubs or herbs, often parasitic on the roots of other plants. Leaves alternate or opposite, simple and entire, sometimes reduced to minute scales or altogether wanting ; stipules absent. Flowers regular, hermaphrodite or unisexual, usually small and greenish, solitary or in axillary or terminal cymes or spikes. Perianth superior or inferior, 3–6-lobed or -partite ; lobes valvate, often hairy behind the anthers. Stamens 3–6, inserted on the perianth-lobes and opposite to them ; anthers 2-celled. Ovary inferior, rarely superior, 1-celled ; style short ; stigma capitate or 3–4-lobed ; ovules 2–3, pendulous from a central column. Fruit an indehiscent nut or drupe. Seed solitary, globose or ovoid ; albumen copious, fleshy ; embryo usually small, terete, radicle superior.

Sprague & Sumerhayes in Kew Bulletin (1927) p. 197.

MIDA (A.Cunn.) Benth.
Tendency to unisexuality. Ovary semi-inferior; shortly cupular perianth-tube; ~~strictly ♀ flowers~~. Flowers sometimes unisexual. Fruits turbinate.
M. salicifolia, A. Cunn.
"As a result of investigations in the field, Cockayne and Allan (Trans. N.Z. Inst. lvii. 57: 1927) accept M. salicifolia and M. myrtifolia as independent species, and suggest that M. eucalyptoides may be a hybrid between them. From Cunningham's descriptions of M. salicifolia and myrtifolia we are unable to draw a line between these two species in the herbarium, and await further descriptions of them by Cockayne and Allan before coming to a definite conclusion."

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A tall handsome tree, easily distinguished by its fastigiate mode of growth. The wood is beautifully variegated, reddish on a light-brown ground, and is much used for inlaying and cabinetwork, ornamental turnery, &c. For an account of the fertilization of the flowers, see a paper by myself in vol. ii of the Journal of the Australasian Association. Mr. A. Allison sends me a curious sport in which the leaves are dichotomously forked.

Family XXX. **SANTALACEAE.**

Trees or shrubs or herbs, often parasitic on the roots of other plants. Leaves alternate or opposite, simple and entire, sometimes reduced to minute scales or altogether wanting ; stipules absent. Flowers regular, hermaphrodite or unisexual, usually small and greenish, solitary or in axillary or terminal cymes or spikes. Perianth superior or inferior, 3–6-lobed or -partite ; lobes valvate, often hairy behind the anthers. Stamens 3–6, inserted on the perianth-lobes and opposite to them ; anthers 2-celled. Ovary inferior, rarely superior, 1-celled ; style short ; stigma capitate or 3–4-lobed ; ovules 2–3, pendulous from a central column. Fruit an indehiscent nut or drupe. Seed solitary, globose or ovoid ; albumen copious, fleshy ; embryo usually small, terete, radicle superior.

A family of moderate size, widely dispersed in both temperate and tropical regions. era 28 ; species not much exceeding 250. The only species of much economic value *antalum album*, which yields the well-known sandalwood. Both the New Zealand era are found in Australia, and *Exocarpus* extends also to the Pacific islands, Malay lipelago, and Madagascar.

fy. Perianth superior. Flowers in axillary cymes .. 1. Fusanus.
fless. Perianth inferior. Flowers in axillary spikes .. 2. Exocarpus.

1. **FUSANUS** R. Br.

Glabrous trees or shrubs. Leaves opposite or alternate. Flowers maphrodite or unisexual by abortion, in axillary or terminal racemes fascicles. Perianth-tube turbinate, adnate to the ovary and produced ve it into a projecting rim ; segments 4–6, each furnished with a tuft nairs at the base. Stamens 4–6, affixed to the base of the perianth-nents and shorter than them ; anthers ovate, dehiscing longitudinally. lining the projecting part of the perianth-tube. Ovary inferior ; style t, conic ; stigma small, 2–4-lobed ; ovules 2–4. Fruit a globose or inate drupe crowned at the summit by the annular scar of the perianth-nents ; exocarp more or less fleshy ; endocarp hard, often rugose. bryo linear, in the centre of the albumen.

A small genus of 5 species, all Australian except the one found in New Zealand.

1. **F. Cunninghamii** *Benth. and Hook. f. ex T. Kirk Forest Fl.* (1889) t. 75, 76.—A small slender tree 10–25 ft. high; trunk seldom more than 9 in. diam.; bark grey. Leaves alternate or more rarely opposite, extremely variable in shape, 2–5 in. long, $\frac{1}{5}$–1 in. broad, linear-lanceolate or lanceolate to ovate-lanceolate or elliptic-oblong or obovate, acute or acuminate, narrowed into short petioles, quite entire, dark-green and glossy, veined, minutely punctate. Inflorescence axillary, of few- or many-flowered racemes or cymes, rarely reduced to few-flowered fascicles. Flowers small, $\frac{1}{6}$–$\frac{1}{4}$ in. diam., brownish-green, hermaphrodite or unisexual by abortion, the females the smallest. Perianth-tube hemispherical; segments 4–6, triangular, deciduous, each with a tuft of yellowish hairs at the base. Stamens the same number as the perianth-segments; filaments short, slender. Disc 4–6-lobed. Stigma 2–4-lobed. Drupe $\frac{1}{3}$–$\frac{1}{2}$ in. long, narrow-turbinate, bright-red, crowned with the annular scar of the perianth-segments.—*Cheesem. Man. N.Z. Fl.* (1906) 624; *Ill. N.Z. Fl.* ii (1914) t. 177. Santalum Cunninghamii *Hook. f. Fl. Nov. Zel.* i (1853) 223; *Handb. N.Z. Fl.* (1864) 247. S. mida *Hook. Ic. Plant.* (1843) tt. 563, 575; *Raoul Choix* (1846) 42. Mida salicifolia, M. eucalyptoides, *and* M. myrtifolia *A. Cunn. Precur.* (1838) n. 340, 341, 342. Ann. Nat. Hist. V1, p. 376

North Island: Lowland forests from the North Cape to Cook Strait, but local to the south of Rotorua. Sea-level to 2000 ft. *Maire; New Zealand Sandalwood.* September–October.

This differs from the Australian species of the genus in the alternate leaves, axillary inflorescence, and turbinate fruit. Cunningham constituted a separate genus for it under the name of *Mida*, and divided it into 3 species based upon the greater or lesser breadth of the leaves. But as leaves of all intermediate shapes can easily be found, and sometimes occur on the same branch, it is impossible to separate his species even as varieties. The wood is hard and dense, very strong and durable, and is occasionally used for ornamental turnery, inlaying, &c.

2. **EXOCARPUS** Labill. 1798. 1:155 t. 14.

Shrubs or small trees. Leaves alternate or rarely opposite, often reduced to minute scales. Flowers minute, hermaphrodite or unisexual by abortion, in small axillary spikes or fascicles, each flower sessile or nearly so in a notch of the rhachis or axillary to a minute scale-like bract. Perianth inferior, divided to the base into 4–6 valvate segments. Stamens the same number as the perianth-segments and inserted near their base; filaments very short and broad; anthers adnate, 2-celled, longitudinally dehiscent. Disc flat, thick, sinuately 4–6-lobed. Ovary superior, fleshy, conic; stigma small, sessile, entire or obscurely lobed. Fruit a nut or drupe seated on the enlarged and often succulent and coloured pedicel. Seed erect; testa thin; albumen copious; embryo minute, cylindric.

Species 16, 9 of which are found in Australia, one of them extending to the Malay Archipelago. The remaining 7 are found in Lord Howe Island, Norfolk Island, New Zealand, the Sandwich Islands, and Madagascar.

1. **E. Bidwillii** *Hook. f. Fl. Nov. Zel.* i (1853) 223, t. 52.—A small much-branched rigid procumbent shrub 6–24 in. high; branches ascending, short, stiff, terete, deeply furrowed. Leaves reduced to minute triangular scales, alternate, persistent. Flowers minute, arranged in short and stout 4–10-flowered spikes springing from the axils of the scale-like leaves; rhachis pubescent, excavated at the insertion of each flower; bract minute.

Perianth-segments usually 5, but sometimes 4 or 6. Stamens the same number; filaments short. Nut oblong, black, about $\frac{1}{5}$ in. long, peduncle much enlarged and thickened, often red and succulent, the perianth-segments persistent under the fruit.—*Handb. N.Z. Fl.* (1864) 246; *Cheesem. Man. N.Z. Fl.* (1906) 625.

long; stigma simple; ovule solitary, erect, adnate to the walls of the ovary. Fruit a 1-seeded berry or drupe, pericarp usually viscid. Seed generally albuminous; embryo straight, axile, radicle superior.

A family comprising 21 genera and about 525 species, chiefly found in the tropical or warm regions of both hemispheres, with comparatively few species in the temperate zones. The order has no important properties or economic value, and the common mistletoe is the only species of any repute. Of the 5 New Zealand genera, *Tupeia* is endemic; the remaining two are widely distributed in both temperate and tropical climates.

* Perianth double.

Ovary more or less distinctly 2- or more celled	1. ELYTRANTHE.
Ovary distinctly 1-celled. Anthers basifixed	2. LORANTHUS.
Ovary distinctly 1-celled. Anthers versatile	3. PHRYGILANTHUS.

** Perianth single.

Leafy. Flowers in axillary or terminal panicles	4. TUPEIA.
Leafless. Flowers at the nodes of the jointed stems or branches	5. KORTHALSELLA.

An important series of memoirs on the structure and classification of this family, by the French botanist Van Tieghem, was printed in the Bulletin of the Botanical Society of France for the years 1894–96 (vols. xli–xliii). One of these memoirs, entitled "Sur les Loranthoidées de la Nouvelle-Zelande," deals specially with the New Zealand species, and contains many original and valuable observations. Van Tieghem's researches have to a large extent supplied the basis of a new classification of the family proposed by Engler in "Die Pflanzenfamilien" (Nachtrage, i, 124), although most of his genera are reduced to the position of subgenera or sections. The following arrangement of the New Zealand species is based largely on Engler's views.

1. ELYTRANTHE Blume.

Parasitic shrubs. Leaves opposite, rarely alternate, usually coriaceous. Flowers hermaphrodite, often brilliantly coloured, red, orange, or yellow, rarely green; sessile in the axils of the leaves, or more generally arranged in short spikes or stalked clusters. Perianth double; outer (calyx) adnate to the ovary, limb obscurely sinuate or truncate; inner (corolla) tubular

1. **F. Cunninghamii** *Benth. and Hook. f. ex T. Kirk Forest Fl.* (1889) t. 75, 76.—A small slender tree 10–25 ft. high; trunk seldom more than 9 in. diam.; bark grey. Leaves alternate or more rarely opposite, extremely variable in shape, 2–5 in. long, $\frac{1}{5}$–1 in. broad, linear-lanceolate or lanceolate [illegible] or obovate, acute or acuminate

(Fusanus cunninghamii, Benth & Hk.)

= 1. Mida salicifolia, (A. Cunn) Ckn. & Allan.

2. Mida myrtifolia (A. Cunn) Ckn. & Allan.

("The species hybridize where they meet and produce 'intermediates'".)

see T.N.Z.I. vol. 57, p. 57. (Ckn. & Allan.)

to the south of Rotorua. Sea-level to 2000 ft. *Maire; New Zealand Sandalwood.* September–October.

This differs from the Australian species of the genus in the alternate leaves, axillary inflorescence, and turbinate fruit. Cunningham constituted a separate genus for it under the name of *Mida*, and divided it into 3 species based upon the greater or lesser breadth of the leaves. But as leaves of all intermediate shapes can easily be found, and sometimes occur on the same branch, it is impossible to separate his species even as varieties. The wood is hard and dense, very strong and durable, and is occasionally used for ornamental turnery, inlaying, &c.

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Shrubs or small trees. Leaves alternate or rarely opposite, often reduced to minute scales. Flowers minute, hermaphrodite or unisexual by abortion, in small axillary spikes or fascicles, each flower sessile or nearly so in a notch of the rhachis or axillary to a minute scale-like bract. Perianth inferior, divided to the base into 4–6 valvate segments. Stamens the same number as the perianth-segments and inserted near their base; filaments very short and broad; anthers adnate, 2-celled, longitudinally dehiscent. Disc flat, thick, sinuately 4–6-lobed. Ovary superior, fleshy, conic; stigma small, sessile, entire or obscurely lobed. Fruit a nut or drupe seated on the enlarged and often succulent and coloured pedicel. Seed erect; testa thin; albumen copious; embryo minute, cylindric.

Species 16, 9 of which are found in Australia, one of them extending to the Malay Archipelago. The remaining 7 are found in Lord Howe Island, Norfolk Island, New Zealand, the Sandwich Islands, and Madagascar.

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Perianth-segments usually 5, but sometimes 4 or 6. Stamens the same number; filaments short. Nut oblong, black, about $\frac{1}{5}$ in. long, peduncle much enlarged and thickened, often red and succulent, the perianth-segments persistent under the fruit.—*Handb. N.Z. Fl.* (1864) 246; *Cheesem. Man. N.Z. Fl.* (1906) 625.

SOUTH ISLAND: Not uncommon in the mountains of Nelson, Marlborough, Canterbury, and northern Otago. 1000–4000 ft. December–February.

See Pflanzenfam. 166. 1935:98

Family XXXI. LORANTHACEAE.

Parasitic shrubs. Leaves opposite or alternate, simple and entire, coriaceous, sometimes reduced to scales or wanting; stipules absent. Flowers regular, hermaphrodite or unisexual, axillary or terminal, solitary or in racemes or spikes or fascicles, usually with a bract on each pedicel and 2 bracteoles below each flower. Perianth double, outer adnate to the ovary, limb short or barely evident, truncate or 4–6-toothed; inner 3–6-lobed, lobes free or united into a tube, valvate. Stamens as many as the divisions of the perianth, usually inserted on them; filaments short or long; anthers introrse, 2-celled. Ovary inferior, 1-celled; style short or long; stigma simple; ovule solitary, erect, adnate to the walls of the ovary. Fruit a 1-seeded berry or drupe, pericarp usually viscid. Seed generally albuminous; embryo straight, axile, radicle superior.

A family comprising 21 genera and about 525 species, chiefly found in the tropical or warm regions of both hemispheres, with comparatively few species in the temperate zones. The order has no important properties or economic value, and the common mistletoe is the only species of any repute. Of the 5 New Zealand genera, *Tupeia* is endemic; the remaining two are widely distributed in both temperate and tropical climates.

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1. ELYTRANTHE Blume. 1930

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or funnel-shaped, usually ultimately splitting into 5–6 segments with recurved tips. Stamens 5–6, inserted on the perianth-segments; anthers basifixed, not versatile. Style filiform; stigma capitate or clavate. Ovary more or less distinctly 2- or more-celled. Fruit a globose or broadly oblong berry.

A genus of from 70 to 80 species, extending from India to Malaya, eastern Polynesia, Australia, and New Zealand. All the New Zealand species are endemic.

* Petals free to the base.

Flowers 1½–2 in. long, in 3–9-flowered racemes	1. *E. Colensoi.*
Flowers 1 in. long, axillary, solitary or 2–4 together ..	2. *E. tetrapetala.*

** Petals united to the middle or nearly so (sometimes dorsally split to the base in *L. Adamsii*).

Flowers 1½–2 in. long, 2 to 4 at the top of a short axillary peduncle	3. *E. Adamsii.*
Flowers ½–¾ in. long, in 10–15-flowered racemes	4. *E. flavida.*

Peraxilla Van Tiegh.

1. **E. Colensoi** *Engl. Pflanzenf. Nachtr.* i (1897) 126.—A large much-branched perfectly glabrous bush; branchlets terete. Leaves opposite, 1½–3 in. long, broadly oblong or obovate or almost orbicular, obtuse, narrowed into a stout petiole ½–¾ in. long, very thick and coriaceous, veinless or the veins very obscure. Peduncles stout, axillary, ½–1 in. long, 3–9-flowered. Flowers sessile, opposite, large, scarlet, 1½–2 in. long; a small deciduous leaf-like bract at the base of each flower; bracteoles wanting. Calyx-limb prominent, cupular, truncate or obscurely sinuate. Corolla terete or nearly so in bud, swollen at the base and towards the tip, splitting into 4 linear petals free to the base. Anthers very narrow-linear, basifixed. Style straight, equalling the corolla.—Loranthus Colensoi *Hook. f. in Hook. Ic. Plant.* (1844) t. 633; *Handb. N.Z. Fl.* (1864) 107; *Cheesem. Man. N.Z. Fl.* (1906) 619. Peraxilla Colensoi *Van Tiegh. in Bull. Soc. Bot. Fr.* xli (1894) 500.

North Island: Lake Waikaremoana, parasitic on *Metrosideros tomentosa*, *Colenso!* Mount Hikurangi and other places in the East Cape district, *Adams* and *Petrie*, *Bishop Williams!* various localities in Wellington Province, *Buchanan! B. C. Aston!* South Island: Not uncommon in wooded districts throughout. Sea-level to 2000 ft. December–January.

A very handsome species. It is usually parasitic on *Nothofagus*, but has also been noticed on *Pittosporum* and *Metrosideros*.

Mr. Mayo informs me that this is occasionally seen on introduced trees. At Motueka (Nelson) he has observed it growing on Pears, Plums, and on *Robinia pseudacacia*.

Peraxilla (Hook.f.) Van Tiegh.

2. **E. tetrapetala** *Engl. Pflanzenf. Nachtr.* i (1897) 126.—A bushy shrub 3–6 ft. high; stems usually numerous from the base, often adhering to the host for a considerable distance; branches spreading, terete, greyish; branchlets compressed, glabrous or minutely pubescent. Leaves opposite and decussate, ½–1¼ in. long, elliptic-oblong or ovate-oblong, rounded at the tip, narrowed into a short petiole at the base, very thick and coriaceous, pale yellowish-green when fresh, reddish when dry, midrib and veins obscure. Flowers bright-red, either solitary or 2–4 together in the axils of the leaves, erect; peduncles short, stout. Calyx-limb cupular, obscurely 4-toothed. Corolla about 1 in. long, swollen and 4-angled at the base, terete above, ultimately splitting to the base into 4 linear petals, which are erect below, but reflexed at the tip. Anthers narrow-linear,

basifixed. Style equalling the corolla; stigma capitate.—Loranthus tetrapetalus *Forst. f. Prodr.* (1786) n. 156; *A. Rich. Fl. Nouv. Zel.* (1832) 268; *A. Cunn. Precur.* (1838) n. 486; *Raoul Choix* (1846) 42; *Hook. f. Fl. Nov. Zel.* i (1853) 99; *Handb. N.Z. Fl.* (1864) 107. Loranthus Fieldii *Buch. in Trans. N.Z. Inst.* xvi (1884) 397; *Cheesem. Man. N.Z. Fl.* (1906) 619. L. decussatus *T. Kirk in Trans. N.Z. Inst.* iii (1871) 162. L. punctatus *Col. in Trans. N.Z. Inst.* xv (1883) 323. Peraxilla tetrapetala *Van Tiegh. Bull. Soc. Bot. Fr.* xli (1894) 500.

North and South Islands: Not uncommon from the Little Barrier Island and Cape Colville to the south-west of Otago. 500–4000 ft. November–January.

In the southern portion of the Dominion this is usually parasitic on *Nothofagus*, in the north on *Quintinia*. Through a curious misconception, Mr. Kirk applied the name of *tetrapetalus* to the plant now known as *L. Adamsii*, and described the true *tetrapetalus* as a distinct species under the name of *L. decussatus*.

Colenso's *Loranthus punctatus* (*Peraxilla punctata* Van Tiegh., *Elytranthe punctata* Engl.) is doubtless identical with this species, judging from an imperfect specimen in his herbarium. Van Tieghem's *Peraxilla uniflora* and *P. Haastii*, both of which are accepted and referred to *Elytranthe* by Engler, are said to be closely allied; but as no descriptions or diagnostic characters are given I cannot express any opinion as to their validity. Van Tieghem also retains Kirk's *Loranthus decussatus* as a distinct species; placing it, under the name of *Peraxilla decussata*, in the immediate neighbourhood of *E. Colensoi*, with which he states it agrees in having the flowers in axillary racemes. No doubt he has been influenced by Kirk's original description, in which the flowers are described as being arranged in "2–4-flowered racemes." But the type specimens in Kirk's herbarium all have the flowers solitary in the axils of the leaves, and this is also the case with specimens collected by myself in the locality where it was first obtained by Kirk. I can entertain no doubt of its identity with *E. tetrapetalus*, and consider that the mistake in Kirk's diagnosis was probably due to some accidental mixture of specimens. As mentioned in the body of this work, the name of *L. tetrapetalus* is applied in Kirk's herbarium to the following species.

Trilepidea (Elytr.) Van Tiegh.

3. **E. Adamsii** *Engl. Pflanzenf. Nachtr.* i (1897) 126.—A perfectly glabrous bush 2–4 ft. high; branchlets terete. Leaves opposite, $1\frac{1}{2}$–$2\frac{1}{4}$ in. long, broadly oblong or oblong-obovate, obtuse, narrowed into a short stout petiole or almost sessile, very thick and coriaceous, veins hardly visible, margins slightly recurved. Peduncles very short, axillary, each bearing 2–4 sessile flowers; a small concave bract and 2 bracteoles at the base of each flower. Flowers rather large, $1\frac{1}{2}$–2 in. long, reddish, more or less tinged with yellowish-green. Calyx-limb short, with 4 minute triangular teeth. Corolla narrow at the base, swollen in the middle, and then contracted just below the limb; lobes 4, separating about $\frac{1}{4}$-way down, reflexed, but the corolla often splits dorsally to the base, the lobes then all turning one way. Anthers narrow-linear, basifixed, tips acute. Style equalling the corolla; stigma capitate. Fruit oblong, bright-red, $\frac{1}{3}$ in. long.—Loranthus Adamsii *Cheesem. in Trans. N.Z. Inst.* xiii (1881) 296; *Man. N.Z. Fl.* (1906) 620; *Ill. N.Z. Fl.* ii (1914) t. 176. Trilepidea Adamsii *Van. Tiegh. in Bull. Soc. Bot. Fr.* xli (1894) 489.

North Island: Auckland—Tryphena Harbour (Great Barrier Island), near the base of Moehau Mountain, Cape Colville, *W. Townson! A. J. Osborne!* Thames goldfields, *Adams! T. F. C., W. Townson!* Hunua, *T. Kirk!*

The foliage of this closely resembles that of *E. Colensoi*, but the flowers are very different. Parasitic on *Coprosma*, *Myrsine*, and *Melicope*. Van Tieghem mentions a *Trilepidea Ralphii* (Bull. Soc. Bot. Fr. xlii (1895) 28) as a closely allied species, but he gives no distinctive characters.

M.S. Hull

4. **E. flavida** *Engl. Pflanzenf. Nachtr.* i (1897) 126.—A sparingly branched glabrous shrub 1–3 ft. high; branches spreading. Leaves opposite, 1–2½ in. long, linear-oblong, usually rounded at the tip, rarely apiculate, narrowed at the base into a short petiole, flat, very coriaceous, veins inconspicuous, or 3–5 diverging from the base; margins thickened and very minutely crenulate when dry, often red when fresh. Racemes axillary, 10–16-flowered, spreading or drooping, ¾–2 in. long; peduncle slender, tetragonous; pedicels opposite and decussate, about ⅙ in. long; bracts obsolete. Flowers ½–¾ in. long, orange-yellow. Calyx-limb minute, cupular, truncate. Corolla slender, swollen above the base; petals united almost to the middle, upper part sharply reflexed, linear-spathulate. Anthers small, linear-oblong. Style rather longer than the corolla; stigma large, capitate.—Loranthus flavidus *Hook. f. Fl. Nov. Zel.* i (1853) 100, t. 27; *Handb. N.Z. Fl.* (1864) 107; *Cheesem. Man. N.Z. Fl.* (1906) 620. L. polychroa *Col. in Trans. N.Z. Inst.* xvii (1885) 241. Alepis flavida *Van Tiegh. Bull. Bot. Soc. Fr.* xli (1894) 489.

North and South Islands: Not uncommon in *Nothofagus* forests from the East Cape, Ruapehu, and Mount Egmont southwards. Sea-level to 3500 ft. December–February.

Van Tieghem accepts Colenso's *Loranthus polychroa*, giving it the name of *Alepis polychroa*. Probably he did not see any specimens, for the examination of one given to me by Mr. Colenso leaves no doubt in my mind that it is absolutely identical with *E. flavida*.

1. **LORANTHUS** Linn.

Parasitic shrubs. Leaves opposite or rarely alternate, entire, coriaceous. Flowers hermaphrodite, often highly coloured, yellow or orange or red, rarely white or greenish, in axillary racemes or cymes, rarely solitary. Perianth double; outer (calyx) adnate to the ovary; limb short, truncate or 4–6-toothed; inner (corolla) tubular, of 4–6 free or more or less connate petals, their tips ultimately spreading or reflexed. Stamens as many as the petals and inserted on them; filaments distinct; anthers adnate. Ovary inferior, 1-celled; style filiform; stigma terminal. Fruit a berry.

A large genus of about 350 species, abundant in the tropics, but rare in temperate regions. The single New Zealand species is endemic.

1. **L. micranthus** *Hook. f. Fl. Nov. Zel.* i (1853) 100.—A perfectly glabrous bushy shrub 2–5 ft. high; branches terete, the younger ones flattened and 2-edged. Leaves opposite, 1½–3 in. long, oblong or elliptic-oblong or oblong-obovate, rounded at the tip, narrowed into a stout petiole about ⅓ in. long, thick and coriaceous, veins very obscure. Panicles small, ½–¾ in. long, axillary, trichotomously branched, many-flowered; branches slender, divaricating. Flowers minute, greenish, ⅛ in. long. Calyx-tube cylindrical; limb very minute, truncate. Corolla of 4 linear-oblong spreading petals, free to the base. Anthers small, oblong, basifixed. Style stout, short, suddenly twisted up and down at the middle; stigma lateral, capitate. Berry bright-yellow, oblong, viscid, ⅓ in. long.—*Handb. N.Z. Fl.* (1864) 107; *Cheesem. Man. N.Z. Fl.* (1906) 618, 1149. Ileostylus micranthus *Van Tiegh. in Bull. Soc. Bot. Fr.* xli (1894) 489. I. Kirkii *Van Tiegh. l.c.* xliii (1895) 25. V. antarcticum *A. Cunn. Precur.* (1838) n. 483 (*not of Forst.*).

North and South Islands, Stewart Island: Abundant in lowland districts throughout. Sea-level to 2000 ft. October–November.

Easily distinguished by its small green flowers. Parasitic on *Coprosma, Melicope, Leptospermum,* &c. At the native settlement of Waihi, at the south end of Lake Taupo, it grows in great abundance on Pear and Plum trees. Van Tieghem's *Ileostylus Kirkii* is based upon specimens collected near Auckland by Kirk, and is said to differ from the type in the shape and structure of the leaves. But no second species exists in Mr. Kirk's herbarium, and the typical form is the only one I have seen near Auckland.

3. **PHRYGILANTHUS** Eichl.

Parasitic shrubs. Leaves opposite, seldom alternate, coriaceous. Flowers conspicuous, red, yellow, or white, usually arranged in few- or many-flowered trichotomous panicles. Perianth double; outer (calyx) adnate to the ovary, limb short, obscurely 4–6-toothed or almost truncate; inner (corolla) of 4–6 free or slightly cohering petals. Stamens 5–6, long and filiform; anthers versatile; pollen 3-lobed. Style long, filiform, ovary 1-celled. Fruit globose or oblong.

A widely diffused tropical genus, containing from 20 to 30 species. The two found in New Zealand are both endemic.

Flowers in axillary trichotomous panicles .. .. .. 1. *P. tenuiflorus.*
Flowers in terminal trichotomous panicles .. .. .. 2. *P. Raoulii.*

1. **P. tenuiflorus** (Hook. f.) *Engl. Pflanzenf. Nachtr.* i (1897) 134. — A small glabrous shrub; branches slender, terete. Leaves opposite, 1–1½ in. long, obovate or obovate-oblong, obtuse, narrowed into short slender petioles, veins few, slender. Flowers about 1 in. long, in axillary trichotomous puberulous panicles; peduncles and pedicels slender, divaricating, about ¼ in. long. Corolla slender, terete, curved; petals very narrow, united ⅔-way up, but perhaps ultimately separating. Anthers oblong, versatile. Style slender; stigma simple.—Loranthus tenuiflorus *Hook. f. Fl. Nov. Zel.* i (1853) 100; *Handb. N.Z. Fl.* (1864) 107; *Cheesem. Man. N.Z. Fl.* (1906) 620. Hookerella tenuiflora *Van. Tiegh. in Bull. Soc. Bot. Fr.* xiii (1895) 25.

North Island: Locality unknown.

Founded upon a single specimen in the Kew Herbarium, the exact locality of which is not known. It is evidently a most distinct species, differing from all others found in New Zealand (except the following) in the many-flowered trichotomous panicles and versatile anthers. The latter are not fully described by Hooker, but in the "Genera Plantarum" the species is referred to *Phrygilanthus,* in which they are versatile.

2. **P. Raoulii** Van Tiegh. *Engl. Pflanzenf. Nachtr.* i (1897) 134.—I have seen no specimens of this, which is quite unknown to New Zealand botanists. According to Van Tieghem, it differs radically from *P. tenuiflorus* in the inflorescence being terminal and not axillary, and in the flowers being pentamerous.—Mullerina Raoulii *Van Tiegh. in Bull. Soc. Bot. Fr.* xlii (1895) 25.

North Island: Bay of Islands, *Raoul* (on *Metrosideros*); Whangaroa, *A. Cunningham* (on *Metrosideros* and *Vitex*).

According to Van Tieghem, this species was confused by both Cunningham and Raoul with Forster's *Loranthus tetrapetalus,* the *Elytranthe tetrapetala* of this work. In his "Precursor," Cunningham certainly speaks of *L. tetrapetalus* as having been gathered by himself and his brother at the Bay of Islands and Whangaroa, districts altogether outside the range of Forster's *L. tetrapetalus.* Raoul includes *L. tetrapetalus* in the list of plants collected by himself, but does not give any locality. It is much to be desired that some resident at the Bay of Islands or Whangaroa would investigate the matter.

4. **TUPEIA** Cham. et Schl.

A parasitic shrub; branches terete, jointed. Leaves opposite or alternate, flat, broad or narrow. Flowers dioecious, in small axillary and terminal panicles. Perianth-tube of the male flowers very small, of the female flowers adnate to the ovary; limb 4-partite, rarely 5-partite. Stamens in the male flowers affixed to the base of the segments; filaments long, filiform; anthers ovate-oblong. Ovary in the female flowers inferior, ovoid; style short and thick; stigma obtuse. Fruit a subglobose 1-seeded berry; mesocarp succulent and viscid. Seed globose; albumen copious, fleshy; embryo almost terete.

The genus is limited to a single species, endemic in New Zealand.

1. **T. antarctica** *Cham. and Schl. in Linnaea*, iii (1828) 203.—A small branching shrub 2–3 ft. high; bark pale; branchlets finely pubescent. Leaves very variable in size and shape, $\frac{1}{2}$–$2\frac{1}{2}$ in. long, from broad ovate-rhomboid to elliptic- or oblong-lanceolate, acute or obtuse, narrowed into short petioles, pale-green, rather thin; veins faint but evident, anastomosing. Panicles shorter than the leaves, 6–12-flowered; peduncles and pedicles slender, pubescent. Flowers small, $\frac{1}{6}$ in. diam., greenish-yellow, often very abundantly produced. Segments of the male perianth linear-oblong or oblong-spathulate, of the female narrower and more acute. Stigma large, globular, obscurely lobed. Berry about $\frac{1}{4}$ in. diam., white or pink spotted with darker pink; pulp extremely viscid.—*Hook. f. Fl. Nov. Zel.* i (1853) 101, t. 26; *Handb. N.Z. Fl.* (1864) 108; *Cheesem. Man. N.Z. Fl.* (1906) 621. T. Cunninghamii *Miq. in Linnaea*, xviii (1844) 85. T. pubigera *Miq. l.c.* 86. T. undulata *Col. in Trans. N.Z. Inst.* xvi (1884) 329. Viscum antarcticum *Forst. f. Prodr.* (1786) n. 370; *A. Rich. Fl. Nouv. Zel.* (1832) 269; *Raoul Choix* (1846) 42. V. pubigerum *A. Cunn. Precur.* (1836) 484.

North and South Islands: Not uncommon in wooded districts throughout. Sea-level to 3000 ft. *Pirita.* October–December.

Van Tieghem draws attention to the fact that this species is not simply dioecious, as described by Hooker, but consists of three sorts of individuals—hermaphrodites, males, and females. This peculiarity was first pointed out by A. Richard, from Foster's manuscripts (Flore Nouv.-Zel. 269).

Tupeia is occasionally doubly parasitic. Many years ago Kirk recorded an instance where it was parasitic on *Elytranthe*, growing on *Nothofagus*. Quite lately Mr. W. A. Thomson has brought under my notice an instance where it was growing on *Loranthus micranthus*, in its turn parasitic on the common hawthorn!

5. **KORTHALSELLA** Van Tiegh.

Parasitic shrubs, often of small size; branches opposite, divaricate and dichotomous, flattened or terete, jointed; leaves wanting or reduced to minute scales. Flowers monoecious, very small, arranged in whorls or spikes at the top of the joints of the stem or branches. Perianth-tube of the male flowers very short and solid; of the females adnate to the ovary, limb 3–4-partite. Stamens 3–4; anthers 2-celled. Ovary inferior; stigma large, sessile. Fruit a 1-seeded berry, usually crowned by the remains of the perianth.

From 15 to 20 species are known, ranging from India and Malaya southwards and eastwards to New Zealand and the Sandwich Islands. *Korthalsella amentacea* Van Tieghem, a New Caledonian species, is erroneously stated in the "Pflanzenfamilien" to be a native of New Zealand.

Joints terete, $\frac{1}{10}$–$\frac{1}{3}$ in. long, $\frac{1}{8}$–$\frac{1}{3}$ in. broad. Flowers sessile, in whorls between the joints .. .. 1. *K. salicornioides.*
Joints flat, broadly obovate, $\frac{1}{5}$–$\frac{1}{2}$ in. long, $\frac{1}{8}$–$\frac{1}{3}$ in. broad. Flowers spicate, the spikes in lateral pairs and 1–3 terminal .. 2. *K. Lindsayi.*
Joints flat, linear-spathulate, $\frac{1}{4}$–$\frac{1}{2}$ in. long, $\frac{1}{20}$–$\frac{1}{8}$ in. broad. Flowers spicate, the spikes solitary .. .. .. 3. *K. clavata.*

1. **K. salicornioides** *Van. Tiegh. in Bull. Soc. Bot. Fr.* xliii (1896) 165.—A small tufted perfectly glabrous much-branched leafless species 2–4 in. high; branches opposite, rather succulent, terete, jointed; joints $\frac{1}{10}$–$\frac{1}{3}$ in. long, $\frac{1}{25}$ in. broad, terete or obscurely flattened, expanded at the tip. Flowers very minute, dioecious, 4–8 together at the nodes, forming a ring round the branch, partly concealed by the expanded tip of the joints. Male flowers much the smallest; perianth-segments 3, triangular, each bearing a sessile anther on its inner face. Female flowers more numerous; ovary ovoid, crowned by 3 very minute perianth-lobes. Fruit $\frac{1}{20}$ in. long, ellipsoid, tipped by the persistent perianth-segments.—Viscum salicornioides *A. Cunn. Precur.* (1838) n. 485; *Raoul Choix* (1846) 42; *Hook. f. Fl. Nov. Zel.* i (1853) 101; *Handb. N.Z. Fl.* (1864) 108; *Cheesem. Man. N.Z. Fl.* (1906) 623.

North and South Islands: From Mangonui and Kaitaia southwards to Dunedin, but often local. Sea-level to 1500 ft.

Usually parasitic on *Leptospermum*, but also seen on *Gaultheria* and *Dracophyllum*. Although it stretches through almost the whole length of the Dominion, it is exceedingly local and rarely occurs in any great quantity. I have given a list of the chief habitats known to me in Trans. N.Z. Inst. xliii (1910) 182.

2. **K. Lindsayi** *Engl. Pflanzenf. Nachtr.* i (1897) 138.—A small succulent perfectly glabrous sparingly branched leafless little plant 2–6 in. high; branches opposite, divaricate, jointed; joints much flattened, $\frac{1}{5}$–$\frac{1}{2}$ in. long, $\frac{1}{8}$–$\frac{1}{3}$ in. broad, broadly obovate to obovate-spathulate, coriaceous,

Korthalsella clavata =
K. lindsayi, var. clavata (Kirk) Danser
see Bulletin Jard. Bot. Buitenzorg, Série III
Vol. XIV. June 1937. page 130.

naki—Mangamahu, *H. Bolton!* Wellington—Lake Wairarapa and Wainuiomata, *B. C. Aston!* South Island: Marlborough—Queen Charlotte Sound, *J. H. Macmahon!* Canterbury—Banks Peninsula, *J. B. Armstrong!* Broken River, *J. D. Enys! T. F. C.* Otago—Vicinity of Dunedin, *Lindsay, Buchanan! Petrie!* Winton, *T. Kirk:* Lake Wanaka, *Cockayne.*

Parasitic on *Sophora, Melicope, Myrtus, Metrosideros, Coprosma, Myrsine,* &c. I am indebted to Mr. Bolton for specimens of *Melicope simplex* showing both this species and *K. salicornioides* parasitic on the same branch.

4. **TUPEIA** Cham. et Schl. 1828.

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The genus is limited to a single species, endemic in New Zealand.

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North and South Islands: Not uncommon in wooded districts throughout. Sea-level to 3000 ft. *Pirita.* October–December.

See J. Adams' key for double perianths

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Parasitic shrubs, often of small size; branches opposite, divaricate and dichotomous, flattened or terete, jointed; leaves wanting or reduced to minute scales. Flowers monoecious, very small, arranged in whorls or spikes at the top of the joints of the stem or branches. Perianth-tube of the male flowers very short and solid; of the females adnate to the ovary, limb 3–4-partite. Stamens 3–4; anthers 2-celled. Ovary inferior; stigma large, sessile. Fruit a 1-seeded berry, usually crowned by the remains of the perianth.

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North and South Islands: From Mangonui and Kaitaia southwards to Dunedin, but often local. Sea-level to 1500 ft.

Usually parasitic on *Leptospermum*, but also seen on *Gaultheria* and *Dracophyllum*. Although it stretches through almost the whole length of the Dominion, it is exceedingly local and rarely occurs in any great quantity. I have given a list of the chief habitats known to me in Trans. N.Z. Inst. xliii (1910) 182.

2. **K. Lindsayi** *Engl. Pflanzenf. Nachtr.* i (1897) 138.—A small succulent perfectly glabrous sparingly branched leafless little plant 2–6 in. high; branches opposite, divaricate, jointed; joints much flattened, $\frac{1}{5}$–$\frac{1}{2}$ in. long, $\frac{1}{8}$–$\frac{1}{3}$ in. broad, broadly obovate to obovate-spathulate, coriaceous, dark-green, often punctate. Spikes usually 2 (rarely 4) to each node and 1 to 3 at the top of the terminal joint, about $\frac{1}{4}$ in. long, jointed, the tip of each successive joint expanded and enclosing a whorl of 6–10 closely packed flowers. Flowers very minute, dioecious; the males pyriform, of 3 fleshy perianth-segments, each bearing a sessile anther on its inner face; the females of an ovoid ovary crowned by 3–4 perianth-lobes. Fruit obovoid, $\frac{1}{15}$ in. long, tipped by the persistent perianth-lobes.—Viscum Lindsayi *D. Oliver ex Hook. f. Handb. N.Z. Fl.* (1864) 108; *Lindsay Contr. N.Z. Bot.* (1868) 52, t. 2; *Cheesem. Man. N.Z. Fl.* (1906) 622. Heterixia Lindsayi *Van Tiegh. in Bull. Soc. Bot. Fr.* xliii (1896) 138.

North Island: Hawke's Bay—Norsewood, *Colenso!* Patangata, *Tryon!* Taranaki—Mangamahu, *H. Bolton!* Wellington—Lake Wairarapa and Wainuiomata, *B. C. Aston!* South Island: Marlborough—Queen Charlotte Sound, *J. H. Macmahon!* Canterbury—Banks Peninsula, *J. B. Armstrong!* Broken River, *J. D. Enys! T. F. C.* Otago—Vicinity of Dunedin, *Lindsay, Buchanan! Petrie!* Winton, *T. Kirk;* Lake Wanaka, *Cockayne.*

Parasitic on *Sophora, Melicope, Myrtus, Metrosideros, Coprosma, Myrsine,* &c. I am indebted to Mr. Bolton for specimens of *Melicope simplex* showing both this species and *K. salicornioides* parasitic on the same branch.

3. **K. clavata** *Cheesem. Man. N.Z. Fl.* (1906) 1151.—Very closely allied so *K. Lindsayi*, and perhaps only a variety, but a smaller plant, seldom more than 2 in. high, with the joints of the stem much narrower, linear-spathulate, ¼–½ in. long, $\frac{1}{20}$–⅛ in. broad. Spikes apparently always solitary, either terminal or from the nodes. Male flowers not seen, but female flowers and fruit quite like those of *K. Lindsayi*.—Viscum clavatum *T. Kirk in Trans. N.Z. Inst.* xxiv (1892) 429, t. 37; *Cheesem. Man. N.Z. Fl.* (1906) 622.

South Island: Canterbury—Castle Hill basin, 2000–3000 ft., *J. D. Enys! T. Kirk! T. F. C.* Parasitic on *Aristotelia fruticosa*, *Discaria*, and *Coprosma*.

Family XXXII. **BALANOPHORACEAE.**

Low-growing fleshy leafless or scaly root-parasites. Stem reduced to a tuberous globular or misshapen often lobed rhizome. Peduncles short or long, thick, naked or clothed with scattered or imbricate scales. Flowers monoecious or dioecious, minute, crowded in spadix-like heads at the top of the peduncles. Male flowers: Perianth wanting or of 3–6 valvate lobes. Stamens 1–3, rarely more; filaments free or connate into a tube or column; anthers 2–many-celled. Female flowers: Perianth wanting or adnate to the ovary; limb absent or minutely toothed. Ovary ovoid or globose, 1–3-celled; styles 1–2, long or short or almost absent; stigmas simple or capitellate, sometimes sessile and discoid; ovules solitary in each cell, pendulous, anatropous. Fruit a minute crustaceous or coriaceous 1-seeded utricle or nut. Seed adherent to the pericarp, albuminous; embryo most minute.

A small but very remarkable family of fleshy root-parasites, chiefly tropical in its distribution, but nowhere plentiful. Genera, 14; species, 35.

DACTYLANTHUS Hook. f.

A root-parasite. Rhizome usually subterranean, perennial, hard and woody, rounded or amorphous, often irregularly lobed, surface rough with small tubercles or warts. Flowering stems or peduncles annual, numerous, crowded, clavate, clothed throughout with imbricate ovate or oblong brownish scales, the upper of which are larger and more closely placed, surrounding the spadices. Spadices numerous at the ends of the peduncles, slender, erect, cylindrical or slightly fusiform. Flowers very minute, densely packed, monoecious. Male flowers: Perianth wanting or of 2 minute subulate processes. Stamens 1 or 2; filaments very short; anthers didymous, 2-celled. Female flowers: Perianth adnate to the ovary; limb of 2 or 3 erect subulate segments. Ovary stipitate, ovoid-oblong, 1-celled; style long, filiform; stigma terminal; ovule solitary, apparently pendulous. Fruit minute, crustaceous.

A very distinct monotypic genus, not closely allied to any other, confined to New Zealand.

1. **D. Taylori** *Hook. f. in Trans. Linn. Soc.* xxii (1859) 425, t. 75.—Rhizome stout, varying in size according to the age of the plant, 1–12 in. diam. or more. Flowering stems 2–6 in. high, ½–1 in. diam., fleshy when

young. Scales from $\frac{1}{4}$ to $\frac{1}{2}$ in. long at the base of the peduncle, larger above, frequently 1 in. Spadices almost concealed by the upper scales, 10–30 together or more, $\frac{3}{4}$–$1\frac{1}{2}$ in. long. Flowers rather loosely placed towards the base of the spadix, very densely packed elsewhere.—*Handb. N.Z. Fl.* (1864) 255; *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 493; *Cheesem. Man. N.Z. Fl.* (1906) 625; *Ill. N.Z. Fl.* ii (1914) t. 178.

North Island: Auckland—Plateau between Hokianga and the Northern Wairoa, *P. Bedlington!* from Port Charles to Cape Colville, *H. Nairn!* forest plateau behind the Township of Thames, *T. Kirk*, *W. Townson!* East Cape district, *H. Hill!* Hawke's Bay—Runanga and Opepe, near Taupo, *H. Hill*, *T. F. C.*; Tarawera and Nuhaka, *A. Hamilton*; Hawkston and Patoka, *F. Hutchinson!* Taranaki—Mount Egmont, *W. H. Skinner*, *Petrie*, *Cockayne*. Wellington — Upper Wanganui at Pipiriki, *E. Phillips Turner*; Upper Waitotara, *J. R. Annabell!* between the Upper Wangaehu and Taupo, *Rev. R. Taylor*, *H. C. Field!* Upper Rangitikei, *J. P. Marshall*, *E. Phillips Turner*; Kaitoke, near Wellington, *J. S. Tennant* and *B. C. Aston!* Sea-level to 3500 ft. *Pua-reinga.* February–April.

Since the first edition of this work was published much additional information respecting this remarkable plant has been obtained. This I have collated and published in my "Illustrations of the N.Z. Flora" (vol. ii, t. 178), and in the Trans. N.Z. Inst. (vol. lii (1920) 12). Students should refer to these works for much matter which from the exigencies of space cannot be given here. I may mention, however, that through Mr. Townson's investigations it has been definitely proved that spadices of both sexes occur on nearly all full-sized rhizomes.

Family XXXIII. **POLYGONACEAE.**

Herbs or shrubs or woody climbers. Leaves alternate or rarely opposite, simple, entire or serrulate. Stipules thin, scarious or membranous, forming a sheath round the stem. Flowers small, regular, usually hermaphrodite, herbaceous or coloured, often jointed on the pedicel, clustered in the axils of the leaves or in spikes or racemes, often forming terminal panicles. Perianth inferior, persistent; segments 3–6, free or connate at the base, imbricate. Stamens 5–9, rarely more or less, hypogynous or perigynous; filaments capillary or subulate, free or connate at the base; anthers 2-celled. Ovary superior, compressed or 3-gonous; styles 1–3; ovule solitary, basal, orthotropous. Fruit a small hard indehiscent trigonous or compressed nut, usually enclosed in the persistent perianth. Seed erect; testa membranous; albumen copious, farinaceous; embryo variable in position, radicle superior.

A rather large family, spread over the whole world, but most abundant in the North Temperate Zone. Genera 30; species over 700. The roots of many species are nauseous and purgative, the medicinal rhubarb being a well-known instance. On the other hand, the stems and leaves are frequently acid and refreshing, as the garden-rhubarb and the common sorrel. Buckwheat (*Fagopyrum*) is the only edible plant of any consequence. Of the 3 New Zealand genera, *Muehlenbeckia* extends to Australia and South America; the remaining 2 are widely distributed in both hemispheres.

Flowers hermaphrodite. Perianth-segments 5, not succulent in fruit	1. Polygonum.
Flowers hermaphrodite. Perianth-segments 6, the 3 inner enlarging and closing over the fruit, not succulent ..	2. Rumex.
Flowers unisexual. Perianth-segments 5, enlarged and succulent in fruit	3. Muehlenbeckia.

1. **POLYGONUM** Linn.

Herbs, rarely shrubby at the base. Leaves alternate; stipules membranous, usually tubular and closely sheathing the stem. Flowers small, hermaphrodite, clustered; clusters either axillary or in racemes or spikes or panicles; bracts and bracteoles membranous, ochreate; pedicels usually jointed. Perianth 5-partite, green or coloured; segments equal or the 2 or 3 outer ones the largest. Stamens 5–8. Ovary compressed or 3-gonous; styles 2 or 3, free or connate at the base; stigmas usually capitellate. Nuts compressed or 3-gonous, included in the persistent perianth. Seed albuminous; embryo excentric or lateral; radicle long, superior.

A large and almost cosmopolitan genus, including over 175 species. The three found in New Zealand are all widely distributed.

* Stems prostrate. Flowers in axillary clusters.

Stems long, wiry, sparingly branched. Perianth $\frac{1}{8}$ in. long. Nut minutely striate or punctate .. .. 1. *P. aviculare.*
Stems short, compactly branched. Perianth $\frac{1}{12}$ in. long. Nut smooth and polished .. .. 2. P. *plebeium.*

** Stems erect or ascending above. Flowers in slender terminal spikes.

Leaves 2–5 in., lanceolate. Stipules ciliate and pilose. Spikes very slender, 1–2 in. long .. .. 3. *P. serrulatum.*

For references to several introduced species of *Polygonum*, see the list of naturalized plants appended to this work.

1. **P. aviculare** *Linn. Sp. Plant.* (1753) 362.—A glabrous rigid and wiry prostrate annual, much branched from the base; branches $\frac{1}{2}$–2 ft. long, straggling, grooved, leafy throughout. Leaves scattered, sessile or shortly petioled, $\frac{1}{3}$–1 in. long or more, linear-oblong to lanceolate or linear-lanceolate, rather broader and elliptic-oblong, acute or obtuse, veins indistinct beneath, margins flat or recurved; stipules brown or reddish near the base, silvery-white above, scarious, lacerate to below the middle. Flowers small, $\frac{1}{10}$–$\frac{1}{8}$ in. long, solitary or in clusters of 2–4 in the axils of nearly all the leaves, very shortly pedicelled. Perianth-segments oblong, obtuse, with a green centre and broad white margins. Nut ovoid, obtusely 3-gonous, very minutely striate or punctate.—*Hook. f. Fl. Nov. Zel.* i (1853) 210; *Handb. N.Z. Fl.* (1864) 235; *Benth. Fl. Austral.* v (1870) 267; *Cheesem. Man. N.Z. Fl.* (1906) 589.

North and South Islands: Roadsides and waste places from the North Cape to Foveaux Strait. Most probably an immigrant. Sea-level to 2500 ft. *Knot-grass; Makakaka.* November–March.

It is highly doubtful if this is indigenous anywhere outside Europe and northern Asia, although its present distribution is almost cosmopolitan. So far as its occurrence in New Zealand is concerned, I should certainly have relegated it to the list of naturalized plants had it not been for the positive opinion expressed in favour of its nativity by the late Mr. Kirk. Those interested in the subject should read the papers by Kirk and Travers printed in vols. iv and v of the Trans. N.Z. Inst.

2. **P. plebeium** *R. Br. Prodr.* (1810) 420.—Habit of *P. aviculare*, but smaller and more compactly branched. Stems prostrate, glabrous or minutely scaberulous, 4–12 in. long, rarely more; branches slender, grooved. Leaves more closely placed than in *P. aviculare*, $\frac{1}{6}$–$\frac{1}{2}$ in. long, linear to linear-oblong, rarely linear-spathulate, obtuse or subacute, midrib evident, margins flat or recurved; stipules short, hyaline, lacerate to the middle. Flowers small, $\frac{1}{12}$–$\frac{1}{10}$ in. long, solitary or in clusters of 2–5 in the axils of most of the leaves; pedicels short. Nut smaller than in *P. aviculare*,

See Fl. Nov. Zel. p. 430 re P. prostratum R. Br.

rhomboid, obtusely 3-gonous, smooth and shining.—*Benth. Fl. Austral.* v (1870) 267 ; *Cheesem. Man. N.Z. Fl.* (1906) 589. P. Dryandri *Spreng. Syst.* ii (1825) 255 ; *Hook. f. Fl. Nov. Zel.* i (1853) 210. P. aviculare *var.* Dryandri *Hook. f. Handb. N.Z. Fl.* (1864) 236.

North and South Islands : From the Great Barrier Island and the East Cape southwards to the Bluff, but local in the North Island, most abundant in Canterbury and Otago. Sea-level to 3000 ft. November–March.

Very closely allied to *P. aviculare*, but apparently sufficiently distinct in the smaller size and more compact habit, smaller flowers, and smaller shining and polished nut. A common plant in Australia, tropical Asia, and some parts of Africa.

3. **P. serrulatum** *Lag. Gen. et Sp. Nov.* (1816) 14. — Stems slender, herbaceous, sparingly branched, prostrate and rooting below, ascending or erect above, glabrous, 9–24 in. long or more. Leaves shortly petiolate, 2–5 in. long, lanceolate or linear-lanceolate, acuminate, narrowed to a rounded or subcordate base, membranous, glabrous or strigose on the midrib beneath, margins serrulate ; stipules long, closely sheathing, ciliate and pilose with long erect hairs. Spikes terminal, very slender, simple or sparingly branched, 1–2 in. long ; bracts narrow-turbinate, truncate, margins ciliate. Flowers 2–3 to each bract, small, reddish, $\frac{1}{12}$ in. long. Perianth-segments oblong, obtuse, glabrous and eglandular. Stamens 5 or 6. Style-branches 2, rarely 3. Nut plano-convex with obtuse margins, rarely trigonous, smooth and shining. — *Cheesem. Man. N.Z. Fl.* (1906) 589. P. minus *var.* decipiens *Hook. f. Handb. N.Z. Fl.* (1864) 235. P. prostratum *A. Rich. Fl. Nouv. Zel.* (1832) 177 (*not of R. Br.*). *A. Cunn. Precur.* (1838) n. 358 ; *Raoul Choix* (1846) 42 ; *Hook. f. Fl. Nov. Zel.* i (1853) 209.

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terbury. *Tutunawai.*

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Leaves all radical or
... cordate or hastate at the base, entire or toothed or almost pinnatifid. Flowers hermaphrodite or less commonly unisexual, small, green, in axillary clusters or whorls, often forming simple or panicled racemes. Perianth-segments 6, the 3 inner enlarging and closing over the fruit, margins entire or toothed, midrib often tubercled. Stamens 6. Ovary 3-gonous ; styles short, filiform ; stigmas fimbriate. Nut 3-gonous, included in the enlarged inner perianth-segments, angles acute. Embryo lateral.

A large genus of over 100 species, found in all temperate and many tropical countries, and including several common weeds of cultivation. Both the New Zealand species are endemic.

Flowering stems much divaricately branched, 6–18 in. high. Inner perianth-segments without tubercles, reticulate, margins usually with long curved spines .. .. 1. *R. flexuosus.*

Flowering stems short, stout, depressed, 2–6 in. high. Inner perianth-segments tubercled ; margins entire or with 1 or 2 short teeth .. 2. *R. neglectus.*

Several species of *Rumex* from the Northern Hemisphere have been introduced into the Dominion, and are now widely diffused, the most abundant being the English "docks" *R. obtusifolius, R. crispus,* and *R. viridis ;* and the "sheeps' sorrel" *R. acetosella.* Descriptions of these will be found in any English Flora.

1. **POLYGONUM** Linn.

Herbs, rarely shrubby at the base. Leaves alternate; stipules membranous, usually tubular and closely sheathing the stem. Flowers small, hermaphrodite, clustered; clusters either axillary or in racemes or spikes or panicles; bracts and bracteoles membranous, ochreate; pedicels usually jointed. Perianth 5-partite, green or coloured; segments equal or the 2 or 3 outer ones the largest. Stamens 5–8. Ovary compressed or 3-gonous; styles 2 or 3, free or connate at the base; stigmas usually capitellate. Nuts compressed or 3-gonous, included in the persistent perianth. Seed albuminous; embryo excentric or lateral; radicle long, superior.

A large and almost cosmopolitan genus, including over 175 species. The three found in New Zealand are all widely distributed.

* Stems prostrate. Flowers in axillary clusters.

Stems long, wiry, sparingly branched. Perianth $\frac{1}{8}$ in. long. Nut minutely striate or punctate .. .. 1. *P. aviculare.*
Stems short, compactly branched. Perianth $\frac{1}{12}$ in. long. Nut smooth and polished .. .. 2. *P. plebeium.*

** Stems erect or ascending above. Flowers in slender terminal spikes.

Leaves 2–5 in., lanceolate. Stipules ciliate and pilose. Spikes very slender, 1–2 in. long .. .. 3. *P. serrulatum.*

For references to several introduced species of *Polygonum*, see the list of naturalized plants appended to this work.

1. **P. aviculare** *Linn. Sp. Plant.* (1753) 362.—A glabrous rigid and wiry prostrate annual, much branched from the base; branches $\frac{1}{2}$–2 ft. long, straggling, grooved, leafy throughout. Leaves scattered, sessile or shortly petioled, $\frac{1}{3}$–1 in. long or more, linear-oblong to lanceolate or linear-lanceolate, rather broader and elliptic-oblong [illegible]
beneath, margin
silvery-white at
$\frac{1}{10}$–$\frac{1}{8}$ in. long, s
leaves, very sh
green centre an
minutely striate
N.Z. Fl. (1864)
Fl. (1906) 589.

Polygonum aviculare, Linn.
not native to N.Z. see T.N.Z.I.
vol. 57, p. 66. (Ckn. & Allan).

North and S [illegible] from the North Cape to Foveaux Strait. Most probably an immigrant. Sea-level to 2500 ft. *Knot-grass; Makakaka.* November–March.

It is highly doubtful if this is indigenous anywhere outside Europe and northern Asia, although its present distribution is almost cosmopolitan. So far as its occurrence in New Zealand is concerned, I should certainly have relegated it to the list of naturalized plants had it not been for the positive opinion expressed in favour of its nativity by the late Mr. Kirk. Those interested in the subject should read the papers by Kirk and Travers printed in vols. iv and v of the Trans. N.Z. Inst.

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See 7Q. Trans. p. 430 re P. prostratum R.B.

rhomboid, obtusely 3-gonous, smooth and shining.—*Benth. Fl. Austral.* v (1870) 267 ; *Cheesem. Man. N.Z. Fl.* (1906) 589. P. Dryandri *Spreng. Syst.* ii (1825) 255 ; *Hook. f. Fl. Nov. Zel.* i (1853) 210. P. aviculare *var.* Dryandri *Hook. f. Handb. N.Z. Fl.* (1864) 236.

North and South Islands : From the Great Barrier Island and the East Cape southwards to the Bluff, but local in the North Island, most abundant in Canterbury and Otago. Sea-level to 3000 ft. November–March.

Very closely allied to *P. aviculare*, but apparently sufficiently distinct in the smaller size and more compact habit, smaller flowers, and smaller shining and polished nut. A common plant in Australia, tropical Asia, and some parts of Africa.

3. **P. serrulatum** *Lag. Gen. et Sp. Nov.* (1816) 14. — Stems slender, herbaceous, sparingly branched, prostrate and rooting below, ascending or erect above, glabrous, 9–24 in. long or more. Leaves shortly petiolate, 2–5 in. long, lanceolate or linear-lanceolate, acuminate, narrowed to a rounded or subcordate base, membranous, glabrous or strigose on the midrib beneath, margins serrulate ; stipules long, closely sheathing, ciliate and pilose with long erect hairs. Spikes terminal, very slender, simple or sparingly branched, 1–2 in. long ; bracts narrow-turbinate, truncate, margins ciliate. Flowers 2–3 to each bract, small, reddish, $\frac{1}{12}$ in. long. Perianth-segments oblong, obtuse, glabrous and eglandular. Stamens 5 or 6. Style-branches 2, rarely 3. Nut plano-convex with obtuse margins, rarely trigonous, smooth and shining. — *Cheesem. Man. N.Z. Fl.* (1906) 589. P. minus *var.* decipiens *Hook. f. Handb. N.Z. Fl.* (1864) 235. P. prostratum *A. Rich. Fl. Nouv. Zel.* (1832) 177 (*not of R. Br.*). *A. Cunn. Precur.* (1838) n. 358 ; *Raoul Choix* (1846) 42 ; *Hook. f. Fl. Nov. Zel.* i (1853) 209.

North and South Islands, Chatham Islands : Abundant along the sides of rivers or in lowland swamps from the North Cape to Canterbury. *Tutunawai.* November–March.

A widely distributed plant, ranging through south Europe, western Asia, Africa, and Australia. It differs from *P. minus* in the larger size, the more slender and much more erect habit, and in the longer and more ciliate stipules.

2. **RUMEX** Linn. 1735.

Perennial or annual herbs, very rarely shrubby. Leaves all radical or radical and cauline, often cordate or hastate at the base, entire or toothed or almost pinnatifid. Flowers hermaphrodite or less commonly unisexual, small, green, in axillary clusters or whorls, often forming simple or panicled racemes. Perianth-segments 6, the 3 inner enlarging and closing over the fruit, margins entire or toothed, midrib often tubercled. Stamens 6. Ovary 3-gonous ; styles short, filiform ; stigmas fimbriate. Nut 3-gonous, included in the enlarged inner perianth-segments, angles acute. Embryo lateral.

A large genus of over 100 species, found in all temperate and many tropical countries, and including several common weeds of cultivation. Both the New Zealand species are endemic.

Flowering stems much divaricately branched, 6–18 in. high. Inner perianth-segments without tubercles, reticulate, margins usually with long curved spines .. .. 1. *R. flexuosus.*

Flowering stems short, stout, depressed, 2–6 in. high. Inner perianth-segments tubercled ; margins entire or with 1 or 2 short teeth .. 2. *R. neglectus.*

Several species of *Rumex* from the Northern Hemisphere have been introduced into the Dominion, and are now widely diffused, the most abundant being the English "docks" *R. obtusifolius*, *R. crispus*, and *R. viridis ;* and the "sheeps' sorrel" *R. acetosella.* Descriptions of these will be found in any English Flora.

1. **R. flexuosus** *Sol. ex Forst. f. Prodr.* (1786) n. 515.—A glabrous perennial herb with a diffusely branched stem 6–18 in. high; branches slender, grooved, flexuous, divaricate. Leaves chiefly radical, variable in size, 3–12 in. long, linear or linear-oblong, acute or obtuse, cuneate or truncate or cordate at the base, rarely expanded or subhastate; margins flat or waved. Panicle at first open, but in an advanced fruiting stage the branches are often numerous, spreading and intricate; whorls remote, 4–12-flowered, the lower ones leafy; peduncles jointed near the base, curved, deflexed. Inner segments of the fruiting-perianth about $\frac{1}{10}$ in. long, rhomboid, narrowed into a long acuminate tip, reticulated, without tubercles; margins entire or more usually furnished with 1–4 hooked spines on each side.—*Hook. f. Fl. Nov. Zel.* i (1853) 211; *Handb. N.Z. Fl.* (1864) 237; *Cheesem. Man. N.Z. Fl.* (1906) 590. R. Cunninghamii *Meissn. in DC. Prodr.* xiv (1856) 62. R. Brownianus *A. Cunn. Precur.* (1838) n. 360 (*not of Camp.*); *Raoul Choix* (1846) 42.

Kermadec Islands, North and South Islands: Abundant throughout. Sea-level to 4,000 ft. December–March.

Very closely allied to the Australian *R. Brownii*, to which it was referred by Allan Cunningham, and from which it differs mainly in the more diffusely branched habit.

2. **R. neglectus** *T. Kirk in Trans. N.Z. Inst.* ix (1877) 493.—A glabrous perennial herb 2–6 in. high; rootstock long, stout, often branched above. Leaves rosulate, 1–3 in. long, linear-oblong, obtuse, truncate or cuneate at the base, margins crenate-undulate; petiole almost as long as the blade. Flowering stem short, stout, depressed, simple or with 1–2 branches from the base; dense-flowered or rarely elongated with the whorls interrupted; peduncles usually deflexed. Flowers hermaphrodite. Fruiting perianth subcampanulate, about $\frac{1}{8}$ in. long, thickened at the base; outer segments oblong, obtuse, equalling the tube; inner rather longer, lanceolate, acute, with a tubercle on the midrib and 1 or 2 short teeth on each side.—*D. Oliver in Hook. Ic. Plant.* t. 1245; *Cheesem. Man. N.Z. Fl.* (1906) 591. R. cuneifolius *var.* alismaefolius *Hook f. Fl. Antarct.* i (1844) 67. Wall. Rec. Cant. Mus. 1935. 4:111.

North Island: Pebbly beaches near Wellington, *T. Kirk! B. C. Aston!* South Island: Canterbury—*J. B. Armstrong;* Port Molyneux, Catlin's River, Bluff, *Petrie!* Martin's Bay, *Poppelwell*: Dusky Bay, *Buchanan!* islands in Foveaux Strait, *Cockayne.* Stewart Island: Not uncommon on pebbly and sandy beaches, *Cockayne.* Auckland Island: *Hook. f., T. Kirk! Cockayne! J. S. Tennant!* November–March.

3. MUEHLENBECKIA Meissn. 1840. Nom. Cons.

Large or small shrubs or undershrubs, often climbing, sometimes prostrate or diffusely spreading. Leaves alternate, petiolate, large or small, sometimes wanting; stipules short, loosely sheathing. Flowers polygamous or dioecious, small, whitish, fascicled within small sheathing bracts; fascicles axillary or arranged in axillary or terminal spikes, racemes, or panicles. Perianth deeply 5-partite; segments equal or the outer ones rather larger, often becoming white and succulent in fruit. Stamens 8, rarely fewer, affixed to the base of the perianth; filaments filiform; anthers ovate, in the female flowers reduced to short and thick staminodia or altogether wanting. Ovary 3-gonous, in the male flowers small and rudimentary; styles 3, short; stigmas usually fimbriate. Nut obtusely or acutely 3-gonous, enclosed in the usually more or less succulent perianth.

See Mastride, Bull. Field mus. Nat. Hist. 4 (5) 1927.

In Cheeseman's Manual, page 400, is mentioned Rumex flexuosus Soland ex Forst f. Prodr. (1786) n. 515. Instead of No. n. 515 probably this should say page 90. On that page Forster attributes the name to Solander but gives no description. This is first described in Sprengel, Syst. Veg. 2: 162. 1825. The name is there attributed to Forster. Rechinger in Oesters. Bot. Zeitschr 84: 45. 1935, attributed the name to Solander, but it should have been Forster ex Sprengel, though possibly Soland ex Spreng. If this citation is to be shortened, it should then be Spreng., not Soland (see Internat. Rules, Art. 48, paragraph 2). Type collected by Banks & Solander. Rechinger has annotated U. S. Nat. Herb. specimen as "type" but probably should be "type collection" or "isotype". This specimen came from the British Museum. Presumably the type is still at the British Museum.

Leaves wanting, or, if present, linear. Male flowers in lax spikes; females in few-flowered fascicles .. .. 5. *M. ephedrioides.*

1. **M. australis** *Meissn. Gen. Comm.* (1843) 227.—A much-branched climber, covering shrubs or small trees, or trailing over cliffs or rocks; trunk stout, woody, sometimes 3 in. diam.; bark greyish; branches numerous, flexuous and interlaced, the younger ones grooved and angled, glabrous or faintly scaberulous. Leaves petiolate, 1–3 in. long, ovate or orbicular-oblong, apiculate or acuminate, rarely obtuse, cordate or truncate at the base, thin and membranous, quite glabrous, usually entire, but sometimes panduriform or 3-lobed, margins undulate-crisped; petioles $\frac{1}{3}$–1 in. long; stipules deciduous. Panicles large, axillary and terminal, much branched, $1\frac{1}{2}$–3 in. long or more. Flowers about $\frac{1}{6}$ in. diam., greenish, dioecious; males with 8 stamens and the rudiment of an ovary; females with 8 blunt staminodia and a short triquetrous ovary; stigmas broad, fimbriate. Fruiting perianth closed over the fruit, slightly succulent or almost herbaceous. Nut black, shining, 3-angled and 3-grooved, angles often twisted.—*Cheesem. Man. N.Z. Fl.* (1906) 592. M. adpressa *Hook. f. Handb. N.Z. Fl.* (1864) 236 (*not of Meissn.*). Polygonum australe *A. Rich. Fl. Nouv. Zel.* (1832) 178; *A. Cunn. Precur.* (1838) n. 355; *Hook f. Fl. Nov. Zel.* i (1853) 210; *Raoul Choix* (1846) 42. P. adpressum *A. Cunn. l.c.* (1838) n. 356 (*not of Labill.*). Coccoloba australis *Forst. f. Prodr.* (1786) n. 176.

North and South Islands, Stewart Island, Chatham Islands: Common from the Three Kings Islands and the North Cape southwards. Sea-level to 2000 ft. November–April.

Also found in Norfolk Island, and very closely allied to the Australian *M. adpressa* Meissn.

2. **M. Astoni** *Petrie in Trans. N.Z. Inst.* xliii (1911) 257, t. 2.—A much-branched shrub, forming erect masses 4–6 ft. high and almost as much in diameter; composed of numerous flexuous and interlacing zigzag branches mixed with cane-like woody shoots $\frac{1}{4}$–$\frac{1}{3}$ in. diam. Branches dark-brown or reddish-brown, glabrous; bark furrowed or wrinkled. Leaves in fascicles of 2–3 on short lateral branchlets, small, $\frac{1}{4}$–$\frac{1}{3}$ in. long, rarely more; petiole about $\frac{1}{2}$ the length; blade broadly obcordate, thin and membranous, quite entire; veins indistinct. Flowers minute, in fascicles of 2–4 at the tips of the branchlets. Peduncles very short, sometimes almost wanting. Ripe fruit not seen.

North Island: Coast near Cape Turakirae, Cook Strait, Palliser Bay, *B. C. Aston! Petrie! T. F. C.* South Island: River-flats by the Awatere River, near Seddon, *B. C. Aston!*

A very distinct and peculiar species, quite unlike any other.

SMITHSONIAN INST
Washington 25, D.
U.S.A.
AIR LET
FIRST FOLD

hooked spines
on each side. *Hook. f. Fl. Nov. Zel.* 1 (1853) 211; *Handb. N.Z. Fl.* (1864) 237; *Cheesem. Man. N.Z. Fl.* (1906) 590. R. Cunninghamii *Meissn. in DC. Prodr.* xiv (1856) 62. R. Brownianus *A. Cunn. Precur.* (1838) n. 360 (*not of Camp.*); *Raoul Choix* (1846) 42.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS: Abundant throughout. Sea-level to 4,000 ft. December–March.

Very closely allied to the Australian *R. Brownii*, to which it was referred by Allan Cunningham, and from which it differs mainly in the more diffusely branched habit.

2. **R. neglectus** *T. Kirk in Trans. N.Z. Inst.* ix (1877) 493. — A glabrous perennial herb 2–6 in. high; rootstock long, stout, often branched above. Leaves rosulate, 1–3 in. long, linear-oblong, obtuse, truncate or cuneate at the base, margins crenate-undulate; petiole almost as long as the blade. Flowering stem short, stout, depressed, simple or with 1–2 branches from the base; dense-flowered or rarely elongated with the whorls interrupted; peduncles usually deflexed. Flowers hermaphrodite. Fruiting perianth subcampanulate, about $\frac{1}{8}$ in. long, thickened at the base; outer segments oblong, obtuse, equalling the tube; inner rather longer, lanceolate, acute, with a tubercle on the midrib and 1 or 2 short teeth on each side. — *D. Oliver in Hook. Ic. Plant.* t. 1245; *Cheesem. Man. N.Z. Fl.* (1906) 591. R. cuneifolius *var.* alismaefolius *Hook f. Fl. Antarct.* i (1844) 67. Wall. Rec. Canst. Mus. 1935. 4 111.

NORTH ISLAND: Pebbly beaches near Wellington, *T. Kirk! B. C. Aston!* SOUTH ISLAND: Canterbury—*J. B. Armstrong;* Port Molyneux, Catlin's River, Bluff, *Petrie!* Martin's Bay, *Poppelwell*: Dusky Bay, *Buchanan!* islands in Foveaux Strait, *Cockayne.* STEWART ISLAND: Not uncommon on pebbly and sandy beaches, *Cockayne.* AUCKLAND ISLAND: *Hook. f., T. Kirk! Cockayne! J. S. Tennant!* November–March.

3. MUEHLENBECKIA Meissn. 1840. Mon. Cons

Large or small shrubs or undershrubs, often climbing, sometimes prostrate or diffusely spreading. Leaves alternate, petiolate, large or small, sometimes wanting; stipules short, loosely sheathing. Flowers polygamous or dioecious, small, whitish, fascicled within small sheathing bracts; fascicles axillary or arranged in axillary or terminal spikes, racemes, or panicles. Perianth deeply 5-partite; segments equal or the outer ones rather larger, often becoming white and succulent in fruit. Stamens 8, rarely fewer, affixed to the base of the perianth; filaments filiform; anthers ovate, in the female flowers reduced to short and thick staminodia or altogether wanting. Ovary 3-gonous, in the male flowers small and rudimentary; styles 3, short; stigmas usually fimbriate. Nut obtusely or acutely 3-gonous, enclosed in the usually more or less succulent perianth.

See Maskvide, Bull. Field mus. Nat. Hist. 4 (5) 1927.

A small genus of about 15 species, found in Australia, New Zealand, the Pacific islands, and extra-tropical and Andine South America. Of the four species described below, one is found in Australia and another in Norfolk Island, the remaining two are endemic.

Leaves 1–3 in., broad-ovate, acuminate, membranous. Flowers in much-branched panicles	1. *M. australis.*
An erect densely branched shrub. Leaves small, $\frac{1}{4}$–$\frac{1}{3}$ in. Flowers minute, in fascicles of 2–4	2. *M. Astoni.*
Leaves $\frac{1}{5}$–$\frac{3}{4}$ in., broadly oblong or orbicular. Flowers in spikes, rarely panicled	3. *M. complexa.*
A small prostrate shrub. Leaves $\frac{1}{10}$–$\frac{1}{8}$ in., ovate-oblong or orbicular. Flowers solitary or 2 together	4. *M. axillaris.*
Leaves wanting, or, if present, linear. Male flowers in lax spikes; females in few-flowered fascicles	5. *M. ephedrioides.*

1. **M. australis** (Forst. f.) *Meissn. Gen. Comm.* (1843) 227.—A much-branched climber, covering shrubs or small trees, or trailing over cliffs or rocks; trunk stout, woody, sometimes 3 in. diam.; bark greyish; branches numerous, flexuous and interlaced, the younger ones grooved and angled, glabrous or faintly scaberulous. Leaves petiolate, 1–3 in. long, ovate or orbicular-oblong, apiculate or acuminate, rarely obtuse, cordate or truncate at the base, thin and membranous, quite glabrous, usually entire, but sometimes panduriform or 3-lobed, margins undulate-crisped; petioles $\frac{1}{3}$–1 in. long; stipules deciduous. Panicles large, axillary and terminal, much branched, $1\frac{1}{2}$–3 in. long or more. Flowers about $\frac{1}{6}$ in. diam., greenish, dioecious; males with 8 stamens and the rudiment of an ovary; females with 8 blunt staminodia and a short triquetrous ovary; stigmas broad, fimbriate. Fruiting perianth closed over the fruit, slightly succulent or almost herbaceous. Nut black, shining, 3-angled and 3-grooved, angles often twisted.—*Cheesem. Man. N.Z. Fl.* (1906) 592. M. adpressa *Hook. f. Handb. N.Z. Fl.* (1864) 236 (*not of Meissn.*). Polygonum australe *A. Rich. Fl. Nouv. Zel.* (1832) 178; *A. Cunn. Precur.* (1838) n. 355; *Hook f. Fl. Nov. Zel.* i (1853) 210; *Raoul Choix* (1846) 42. P. adpressum *A. Cunn. l.c.* (1838) n. 356 (*not of Labill.*). Coccoloba australis *Forst. f. Prodr.* (1786) n. 176.

M. delicis Petrie 1926. Chiefs

North and South Islands, Stewart Island, Chatham Islands: Common from the Three Kings Islands and the North Cape southwards. Sea-level to 2000 ft. November–April.

Also found in Norfolk Island, and very closely allied to the Australian *M. adpressa* Meissn.

2. **M. Astoni** *Petrie in Trans. N.Z. Inst.* xliii (1911) 257, t. 2.—A much-branched shrub, forming erect masses 4–6 ft. high and almost as much in diameter; composed of numerous flexuous and interlacing zigzag branches mixed with cane-like woody shoots $\frac{1}{4}$–$\frac{1}{3}$ in. diam. Branches dark-brown or reddish-brown, glabrous; bark furrowed or wrinkled. Leaves in fascicles of 2–3 on short lateral branchlets, small, $\frac{1}{4}$–$\frac{1}{3}$ in. long, rarely more; petiole about $\frac{1}{2}$ the length; blade broadly obcordate, thin and membranous, quite entire; veins indistinct. Flowers minute, in fascicles of 2–4 at the tips of the branchlets. Peduncles very short, sometimes almost wanting. Ripe fruit not seen.

North Island: Coast near Cape Turakirae, Cook Strait, Palliser Bay, *B. C. Aston! Petrie! T. F. C.* South Island: River-flats by the Awatere River, near Seddon, *B. C. Aston!*

A very distinct and peculiar species, quite unlike any other.

Calacinum complexa (A. Cunn.) Meisn.

3. **M. complexa** *Meissn. Gen. Comm.* (1843) 227. — Forming dense thick and elastic prostrate masses many feet in diam., or climbing over bushes or rocks. Stems slender, tough and woody, much interlaced; branches very numerous, flexuous, terete, the ultimate ones pubescent with short stiff hairs; bark dark red-brown. Leaves petiolate, exceedingly variable in size and shape, even on the same plant, $\frac{1}{5}$–$\frac{3}{4}$ in. long or more, broadly oblong or obovate or orbicular, rounded or retuse at the tip, rarely subacute, cordate or truncate or rounded at the base, often contracted in the middle, quite smooth, glabrous or the petiole puberulous, coriaceous or almost membranous, margins even, entire; stipules deciduous. Spikes axillary and terminal, long or short, simple or compound, glabrous or puberulous, sometimes reduced to 2 or 3 flowers, at other times forming a panicle 1–1½ in. long or more. Flowers small, dioecious. Stamens 8. Stigmas very broad, fimbriate. Fruiting-perianth much enlarged, often $\frac{1}{4}$–$\frac{1}{3}$ in. diam., succulent, waxy-white, forming a fleshy cup surrounding the fruit, in some varieties unaltered and herbaceous. Nut black, shining, deeply triquetrous.—*Hook. f. Handb. N.Z. Fl.* (1864) 236; *Cheesem. Man. N.Z. Fl.* (1906) 592. M. paucifolia *Col. in Trans. N.Z. Inst.* xxi (1889) 99. M. truncata *Col. l.c.* xxi (1889) 101. Polygonum complexum *A. Cunn. Precur.* (1838) n. 357; *Raoul Choix* (1846) 42; *Hook. f. Fl. Nov. Zel.* i (1853) 210.

Var. **grandifolia** *H. Carse in Trans. N.Z. Inst.* xlviii (1916) 239.—Size and habit of *M. australe*, but ultimate branches terete and densely pubescent. Leaves almost as large as those of *M. australe*, but texture nearer that of *M. complexa*.

(C. E.)

Var. **microphylla** *Cockayne* in *Trans. N.Z. Inst.* xlviii (1916) 208.—Forming round-topped elastic bushes with the habit of *M. complexa*, but leaves very much smaller, $\frac{1}{20}$–$\frac{1}{10}$ in. long, variable in shape. — M. microphylla *Col. in Trans. N.Z. Inst* xx (1888) 204.

Var. **trilobata** *Cheesem. n. var.* — Leaves regularly and distinctly trilobate or panduriform. M. trilobata *Col. in Trans. N.Z. Inst.* xxi (1889) 100.

North and South Islands, Stewart Island: Abundant throughout, ascending to 2000 ft. *Pohuehue.* November–April.

Varying much in the size and shape of the leaves, the degree of development of the spikes, and the extent to which the perianth enlarges and becomes fleshy in fruit. Mr. Colenso made no less than 4 species, based mainly on variations in the above characters, but his own specimens show how inconstant these distinctions are, and how little they can be relied upon. The four varieties characterized above appear to have the range of the species, except Mr. Carse's var. *grandifolia*, which I only know from Mongonui County.

(Hook. f.)

4. **M. axillaris** *Walp. Ann.* i (1853) 552.—A small much-branched prostrate or diffuse shrubby plant, usually forming densely matted patches 3–12 in. diam., but sometimes open and straggling; stems and branches woody; branchlets puberulous. Leaves on rather long petioles, small, $\frac{1}{10}$–$\frac{1}{3}$ in. long, broadly oblong or ovate-oblong or almost orbicular, obtuse or retuse, rounded at the base, flat, quite glabrous, dotted beneath. Flowers small, solitary or 2 together in the axils of the leaves, or the males rarely forming short few-flowered spikes at the ends of the branchlets; pedicels slender. Stigmas fimbriate. Perianth succulent in fruit or almost unaltered. Nut triquetrous with obtuse angles, black, smooth and shining, rather longer than the perianth.—*Hook. f. Handb. N.Z. Fl.* (1864) 236; *Benth. Fl. Austral.* v (1870) 275; *Cheesem. Man. N.Z. Fl.* (1906) 593; *Ill. N.Z. Fl.* ii (1914) t. 165. M. hypogea *Col. in Trans. N.Z. Inst.* xxi (1889) 98. Polygonum axillare *Hook. f. Fl. Nov. Zel.* i (1853) 211.

M. complexa x ephedroides } T.N.Z.I. 57:70
M. axillaris x "

North Island: Mountain districts in the interior, from Taupo and the East Cape southwards. South Island: Common in mountain districts throughout. Sea-level to 4500 ft. December–March.

Also found in Tasmania and Australia, and reported from Lord Howe Island.

5. **M. ephedrioides** *Hook. f. Fl. Nov. Zel.* i (1853) 211. — A much-branched prostrate shrub; stems 9–36 in. long or more, rigid and wiry, deeply grooved, leafless and rush-like or sparingly leafy; branchlets often scaberulous. Leaves when present few and scattered, petiolate or almost sessile, $\frac{1}{6}$–1 in. long, linear or linear-lanceolate, often dilated or almost hastate at the base, acute or obtuse, glabrous, sometimes scaberulous on the midrib beneath; stipules short, obliquely truncate. Flowers small, polygamous; those on the male plant in lax axillary simple or branched glabrous spikes, often with a few female flowers intermixed; on the female plant in few-flowered fascicles or short dense spikes, usually with 1 or 2 male flowers mixed with the females. Stigmas fimbriate. Perianth succulent or remaining unaltered in fruit. Nut exceeding the perianth, black, smooth and shining, triquetrous with the angles obtuse.—*Handb. N.Z. Fl.* (1864) 237; *Cheesem. Man. N.Z. Fl.* (1906) 593.

Var. **muricatula.** — Smaller and much more slender, branchlets often almost filiform. Leaves usually present, $\frac{1}{6}$–$\frac{1}{2}$ in. long, linear. Perianth-segments membranous in fruit.—M. muricatula *Col. in Trans. N.Z. Inst.* xxii (1890) 482 (perhaps a distinct species). = X. muricata Cheesem. & Allan.

North Island: Hawke's Bay—Near the sea, *Colenso! A. Hamilton!* Cook Strait, *B. C. Aston! T. F. C.;* Upper Rangitikei, *Bishop Williams, Petrie!* South Island: Marlborough—Near Blenheim, *Buchanan! T. Kirk!* Canterbury—Waipara, *Haast!* near the mouth of the Rakaia River, *Cockayne.* Otago—Lower Waitaki, *Hector* and *Buchanan;* Kurow, Awamoko, Roxburgh, *Petrie!* Var. *muricatula:* North Island—Lake Taupo, *Tryon! T. F. C.;* Ruapehu, *H. Hill!* Waipawa, *A. Hamilton!* Sea-level to 3000 ft. December–March.

Easily recognized by the prostrate rush-like stems, which are often entirely leafless.

Family XXXIV. **CHENOPODIACEAE.**

Annual or perennial herbs or shrubs, usually succulent and fleshy, sometimes covered with a mealy scurf. Leaves alternate or very rarely opposite, simple, sometimes wanting, exstipulate. Flowers small, regular, hermaphrodite or unisexual, often dimorphic, variously disposed but usually sessile and clustered, clusters often aggregated into dense or interrupted spikes or panicles. Bracts often wanting, when present herbaceous, not scarious. Perianth inferior, 3–5-lobed or -cleft, herbaceous, persistent, imbricate. Stamens 4–5, rarely fewer, hypogynous or perigynous; filaments subulate or filiform; anthers 2-celled. Ovary superior, 1-celled; style-branches 2–3, either free or united at the base; ovule solitary, basal or lateral, amphitropous. Fruit usually a utricle, rarely a berry, enclosed in the persistent perianth, which is often enlarged or fleshy. Seed horizontal or vertical; testa crustaceous; albumen present and farinaceous or wanting embryo curved or annular or spiral.

A widely spread family, found in all climates, but most plentiful in maritime or saline localities. Genera 80; species between 500 and 600, often difficult of discrimination. The order includes the sugar-beet and mangold, two plants of great commercial importance; also the garden-beet, the spinach, and orache. Many of the species are

see Allan 1939 (VIII) 5-11. J. Bot. Lon.

common weeds of cultivation, and several of these have become naturalized in New Zealand. Of the 6 indigenous genera, 5 are widely spread in temperate and tropical climates, the remaining one (*Rhagodia*) is confined to Australia and New Zealand.

A. Stems leafy, not jointed. Stamens 3–5.

Flowers hermaphrodite or unisexual. Perianth hardly enlarged in fruit. Fruit a berry. Embryo annular	1. RHAGODIA.
Flowers usually hermaphrodite. Perianth hardly enlarged in fruit. Fruit a dry utricle. Embryo annular	2. CHENOPODIUM.
Flowers unisexual; females enclosed within 2 bracts which are much enlarged in fruit. Embryo annular	3. ATRIPLEX.
Leaves fleshy, semiterete. Perianth simply enlarged and fleshy in fruit. Embryo spiral	5. SUAEDA.
Leaves fleshy, pungent-pointed. Perianth enlarged and winged in fruit. Embryo spiral	6. SALSOLA.

B. Stems jointed apparently, leafless. Stamens 1 or 2.

Flowers sunk in cavities between the joints	4. SALICORNIA.

1. **RHAGODIA** R. Br. (& 10

Shrubs or more rarely herbs. Leaves alternate or subopposite, sessile or petiolate. Flowers small, hermaphrodite or monoecious, rarely dioecious, sessile or very shortly pedicelled, in axillary clusters or in terminal spikes or panicles; bracts wanting. Perianth 5-lobed or -partite; segments obtuse, concave, hardly enlarged in fruit. Stamens 5 or fewer, inserted at the base of the perianth; filaments subulate, flattened. Ovary subglobose; styles 2 or very rarely 3, linear or subulate. Fruit a small globose or depressed-globose berry, free from the perianth. Seed horizontal, flattened; testa crustaceous; embryo annular, surrounding the copious mealy albumen.

A small genus of 11 species, all Australian, but one of them found in New Zealand as well.

R. triandra (Forst. f.) Allan 1938. err. det.

1. **R. nutans** *R. Br. Prodr.* (1810) 408.—A much-branched prostrate or procumbent herb, green or the young leaves and branches more or less clothed with white mealy tomentum; stems 9–24 in. long, usually hard and woody at the base. Leaves opposite and alternate, petiolate, ¼–1 in. long, lanceolate or oblong-lanceolate or hastate, acute, cuneate or truncate or cordate at the base, entire, rather thin. Flowers minute, polygamous or dioecious, arranged in short loose-flowered spikes or panicles in the upper axils or terminating the branches. Perianth-segments ovate, obtuse, mealy-tomentose. Male flowers usually with 3 stamens; female flowers with 1 or 2 abortive stamens. Ovary depressed-globose; styles 2. Fruit globose, fleshy, bright-red, ⅛ in. diam.—*Benth. Fl. Austral.* v (1875) 156; *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 408; *Man. N.Z. Fl.* (1906) 578.

KERMADEC ISLANDS, NORTH ISLAND: Rocky places near the sea, not uncommon. SOUTH ISLAND: Sea-cliffs near Cape Foulwind, *W. Townson!* Queen Charlotte Sound, *J. H. Macmahon!* Kaikoura Peninsula, *Spencer!* Banks Peninsula, *R. M. Laing, A. Wall;* near the mouth of the Ashburton River, *H. H. Allan!* Probably abundant on rocky coasts. Inland on island in the Waiau River, near Marble Point, *C. E. Christensen.*

Closely resembles *Chenopodium triandrum* in habit and foliage, and is easily mistaken for it in the absence of fruit. Plentiful along the coast of eastern Australia, from Queensland southwards.

2. **CHENOPODIUM** Linn. 1735.

Annual or perennial erect or prostrate herbs, rarely woody at the base, mealy or glandular-pubescent, seldom glabrous. Leaves alternate, entire or lobed or toothed. Flowers minute, greenish, usually hermaphrodite, sessile in clusters; clusters axillary or in terminal spikes or panicles. Perianth 5-partite, rarely 3–4-partite; segments obtuse, incurved and concave, not at all or very slightly altered in fruit. Stamens 5 or fewer; filaments filiform or flattened, sometimes connate at the base. Ovary depressed or ovoid, styles 2–3, free or united at the base. Fruit an ovoid or depressed membranous utricle, wholly or partially included in the persistent perianth. Seed horizontal or vertical; testa crustaceous; embryo annular, enclosing the copious mealy albumen.

A widely distributed genus of from 60 to 80 species, most abundant in temperate climates. Of those described below, three are common in many parts of the world as weeds of cultivation or wayside plants, and may not be true natives of New Zealand.

* Seed horizontal (rarely vertical in *C. glaucum*).

Intensely foetid, prostrate or decumbent, mealy-pulverulent. Leaves $\frac{1}{6}$–$\frac{1}{2}$ in., triangular-hastate, entire. Flowers in small dense axillary clusters .. .. 1. *C. detestans.*

Prostrate or trailing, often glaucous, mealy-pulverulent. Leaves $\frac{1}{4}$–1 in., triangular-oblong or hastate, entire. Flowers in lax axillary or terminal spikes or panicles .. .. .. 2. *C. triandrum.*

Prostrate, fleshy. Leaves $\frac{1}{2}$–$1\frac{1}{2}$ in., oblong or deltoid, sinuate-lobed, mealy beneath. Flowers in axillary or terminal spikes .. 3. *C. glaucum.*

Erect or spreading, green or slightly mealy. Leaves $\frac{3}{4}$–$1\frac{1}{2}$ in., triangular or rhomboid, toothed or lobed. Flowers in axillary or terminal spikes or panicles .. .. 4. *C. urbicum.*

Erect; aromatic, glandular-pubescent, not mealy. Leaves 1–4 in., ovate-lanceolate, sinuate-toothed. Flowers very numerous, in slender axillary spikes .. .. 5. *C. ambrosioides.*

** Seed vertical.

Glandular-pubescent. Stems 6–18 in., decumbent below, erect above. Leaves $\frac{1}{4}$-$\frac{3}{4}$ in., oblong, sinuate-lobed or pinnatifid. Flowers in dense axillary fascicles .. .. 6. *C. carinatum.*

Small, glandular-pubescent, much branched, prostrate, 2–6 in. long. Leaves $\frac{1}{10}$-$\frac{1}{3}$ in., broadly oblong or orbicular, obscurely sinuate. Flowers in axillary glomerules .. .. 7. *C. pusillum.*

1. **C. detestans** *T. Kirk in Trans. N.Z. Inst.* ix (1877) 550.—A much-branched prostrate or decumbent herb, more or less clothed with a whitish granular meal, and with a strong and offensive odour of stale fish; branches numerous from the root, slender, spreading, 6–18 in. long. Leaves on slender petioles; blade $\frac{1}{6}$–$\frac{1}{2}$ in. long, rarely more, triangular-hastate or rhomboid-ovate, acute, cuneate at the base, entire or with a single tooth on each side. Flowers small, abundantly produced, in dense oblong or globose axillary fascicles, often becoming leafy spikes at the tips of the branches. Perianth-segments 4 or 5, oblong, obtuse, membranous, not completely concealing the fruit. Stamens usually 4. Utricle small, horizontal, depressed, brownish-black, minutely punctulate.—*Cheesem. Man. N.Z. Fl.* (1906) 579.

South Island: Canterbury—Broken River basin, *J. D. Enys! T. Kirk! T. F. C.*; Lake Coleridge, *J. D. Enys!* Otago—Lakes Wanaka and Hawea, *T. Kirk! Petrie!* Maniototo Plain, Cromwell, and other localities in the north and central portions of the province, *Petrie!* 1000–3000 ft. January–March.

Closely allied to the northern *C. vulvaria* Linn., but a smaller plant with smaller often hastate leaves, and with the flowers in dense globose fascicles. It has been recorded from Australia by Dr. J. Murray.

? See Skottsb. Suaveae Weddel. gal. Bot. Tiedy 1134.

See Trans. 72: 324.

2. **C. triandrum** *Forst. f. Prodr.* (1786) n. 129. — A much-branched prostrate or trailing herb, pale-green, glabrous or more or less mealy-tomentose; stems slender, 6–18 in. long, sometimes almost woody at the base. Leaves opposite or alternate, petiolate, ¼–1 in. long, very variable in shape, broadly oblong or orbicular to broadly triangular-hastate, obtuse or rounded at the tip, cuneate or rounded or truncate at the base, thin and membranous, green and glabrous or slightly mealy; petioles slender. Flowers very minute, farinose, in axillary or terminal lax-flowered spikes or panicles. Perianth-segments 4, oblong, obtuse. Stamens 2–4. Styles 2–3. Utricle depressed, more or less covered by the persistent perianth. Seed horizontal, minutely punctate, adherent to the utricle.—*A. Rich. Fl. Nouv. Zel.* (1832) 212; *A. Cunn. Precur.* (1838) n. 361; *Raoul Choix* (1846) 43; *Hook. f. Fl. Nov. Zel.* i (1853) 212; *Handb. N.Z. Fl.* (1864) 230; *Cheesem. Man. N.Z. Fl.* (1906) 580; *Ill. N.Z. Fl.* ii (1914) t. 164.

North and South Islands: From the North Cape southwards to Foveaux Strait, not uncommon near the sea, rare and local inland. November-March.

3. **C. glaucum** *Linn. Sp. Plant.* (1753) 220. — A much-branched prostrate fleshy and succulent annual herb; branches widely spreading, flaccid, glabrous, striate, 4–18 in. long, rarely ascending at the tips. Leaves petiolate, the lower ones ½–1½ in. long, oblong-lanceolate to ovate-oblong or rhomboid, usually obtuse at the tip, cuneate at the base, coarsely and angularly sinuate-toothed or -lobed, fleshy when fresh, thin when dry, green and glabrous above, white with mealy down beneath; upper ones smaller and narrower and more entire. Flowers small, in little clusters arranged in simple or compound axillary or terminal spikes, which are usually more or less farinose. Fruiting-perianth 3–5-partite; segments short, obtuse, appressed to the fruit but not altogether concealing it. Seed horizontal or occasionally vertical, smooth, margins obtuse.—*A. Cunn. Precur.* (1838) n. 363; *Raoul Choix* (1846) 43; *Hook. f. Fl. Nov. Zel.* i (1853) 213; *Handb. N.Z. Fl.* (1864) 230; *Benth. Fl. Austral.* v (1870) 161; *Cheesem. Man. N.Z. Fl.* (1906) 580. C. ambiguum *R. Br. Prodr.* (1810) 407.

North and South Islands, Stewart Island: Common throughout in muddy or sandy places near the sea, also occasionally found in saline localities inland. November–March.

Also occurs in Australia and Tasmania, and common in many parts of Europe and temperate Asia, &c. The New Zealand and Australian plant is sometimes kept as a separate variety or species (*C. ambiguum* R. Br.), but the differences appear to be slight and inconstant.

4. **C. urbicum** *Linn. Sp. Plant.* (1753) 218.—A coarse erect or spreading branching herb 1–2 ft. high or more, green and glabrous or rarely slightly mealy; stem angled, grooved. Lower leaves on slender petioles ½–1 in. long; blade ¾–1½ in., triangular or rhombic-ovate, coarsely and irregularly toothed and lobed, rather thin, green on both surfaces, veined; upper smaller, narrower, more acute. Flowers small, in little clusters arranged in dense leafless axillary spikes, or in terminal panicles which are leafy below. Stamens 5, exserted. Styles short. Fruiting-perianth $\frac{1}{15}$ in. diam.; segments obtuse, not completely covering the utricle. Seed horizontal, much depressed, minutely punctulate, margins obtuse.—*Hook. f. Fl. Nov. Zel.* i (1853) 213; *Handb. N.Z. Fl.* (1864) 230; *Cheesem. Man. N.Z. Fl.* (1906) 581.

North Island: East Coast, *Colenso!* Has also appeared as a naturalized plant near Wellington. South Island: Not uncommon, especially in South Canterbury and Otago. Sea-level to 1000 ft. December–March.

A common European weed, which has become naturalized in North America and some other countries. It is probably not a true native of New Zealand.

5. **C. ambrosioides** *Linn. Sp. Plant.* (1753) 219.—An erect much-branched strong-smelling glandular annual herb 1–3 ft. high; branches slender, strict, leafy. Leaves shortly petiolate, 1–4 in. long, ovate- or

Chenopodium ambrosioides, Linn.

not native to N.Z. see T.N.Z.I.

vol. 57, p. 63. (Ckn. & Allan).

(1853) 213; *Handb. N.Z. Fl.* (1864) 230; *Benth. Fl. Austral.* v (1870) 162; *Cheesem. Man. N.Z. Fl.* (1906) 581.

North Cape to Taranaki and 30 years ago. Has appeared pril.

-A much-branched strong- ly decumbent at the base, on slender

Chenopodium carinatum, R.Br.

not native to N.Z. see T.N.Z.I.

vol. 57, p. 63. (Ckn. & Allan).

and B. glandulosum *Moq. in DC. Prodr.* xiii (1849) 81, 82.

North and South Islands: Warm dry soils from to central Otago, rare and local. December

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much- anches e tips. diam. ong or orbicular, rounded at the tip, or obscurely sinuate, rather thin, both surfaces glandular-pubescent, veins prominent beneath. Flowers very minute, in small and dense few- or many-flowered axillary glomerules. Perianth-segments usually 4, erect, linear-oblong, concave, membranous, pubescent, incurved over the fruit but not completely concealing it. Stamen usually 1. Utricle small,

? See Skottsb. Suaveae Waddel. gol. Bot. Tiedy 1934.

See Trans. 72: 324.

2. **C. triandrum** *Forst. f. Prodr.* (1786) n. 129. — A much-branched prostrate or trailing herb, pale-green, glabrous or more or less mealy-tomentose; stems slender, 6–18 in. long, sometimes almost woody at the base. Leaves opposite or alternate, petiolate, ¼–1 in. long, very variable in shape, broadly oblong or orbicular to broadly triangular-hastate, obtuse or rounded at the tip, cuneate or rounded or truncate at the base, thin and membranous, green and glabrous or slightly mealy; petioles slender. Flowers very minute, farinose, in axillary or terminal lax-flowered spikes or panicles. Perianth-segments 4, oblong, obtuse. Stamens 2–4. Styles 2–3. Utricle depressed, more or less covered by the persistent perianth. Seed horizontal, minutely punctate, adherent to the utricle.—*A. Rich. Fl. Nouv. Zel.* (1832) 212; *A. Cunn. Precur.* (1838) n. 361; *Raoul Choix* (1846) 43; *Hook. f. Fl. Nov. Zel.* i (1853) 212; *Handb. N.Z. Fl.* (1864) 230; *Cheesem. Man. N.Z. Fl.* (1906) 580; *Ill. N.Z. Fl.* ii (1914) t. 164.

North and South Islands: From the North Cape southwards to Foveaux Strait, not uncommon near the sea, rare and local inland. November-March.

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CHENOPODIUM
C. glaucum narrow lvs. 3 pr. lobes
ver. seed ex.

North and South Islands, Stewart Island: Common throughout in muddy or sandy places near the sea, also occasionally found in saline localities inland. November–March.

Also occurs in Australia and Tasmania, and common in many parts of Europe and temperate Asia, &c. The New Zealand and Australian plant is sometimes kept as a separate variety or species (*C. ambiguum* R. Br.), but the differences appear to be slight and inconstant.

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Chenopodium urbicum, Linn.
not native to N.Z. see T.N.Z.I.
vol. 57, p. 63. (Ckn. & Allan).

North Island: East Coast, *Colenso!* Has also appeared as a naturalized plant near Wellington. South Island: Not uncommon, especially in South Canterbury and Otago. Sea-level to 1000 ft. December–March.

A common European weed, which has become naturalized in North America and some other countries. It is probably not a true native of New Zealand.

5. **C. ambrosioides** *Linn. Sp. Plant.* (1753) 219.—An erect much-branched strong-smelling glandular annual herb 1–3 ft. high; branches slender, strict, leafy. Leaves shortly petiolate, 1–4 in. long, ovate- or

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North Island: Warm lowland stations from the North Cape to Taranaki and Hawke's Bay, not common. Was much more abundant 30 years ago. Has appeared as a naturalized plant near Wellington. December–April.

6. **C. carinatum** *R. Br. Prodr.* (1810) 407.—A much-branched strong-smelling glandular-pubescent herb; stems usually decumbent at the base, erect or ascending above, 6–18 in. long. Leaves on slender petioles; blade

Chenopodium carinatum, R.Br.
not native to N.Z. see T.N.Z.I.
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and B. glandulosum *Moq. in DC. Prodr.* xiii (1849) 81, 82.

North and South Islands: Warm dry soils from the North Cape to central Otago, rare and local. December–March.

A common Australian plant. It was collected at the Bay of Islands by Cunningham, and may be truly native in the North Auckland Peninsula. Elsewhere it is doubtless naturalized.

7. **C. pusillum** *Hook. f. Handb. N.Z. Fl.* (1864) 231.—A much-branched decumbent or prostrate glandular-pubescent little plant; branches spreading on all sides, 2–6 in. long, slender, leafy, ascending at the tips. Leaves on slender petioles; blade very variable in size, $\frac{1}{10}$–$\frac{1}{3}$ in. diam. or more, broadly oblong to ovate-oblong or orbicular, rounded at the tip, quite entire or obscurely sinuate, rather thin, both surfaces glandular-pubescent, veins prominent beneath. Flowers very minute, in small and dense few- or many-flowered axillary glomerules. Perianth-segments usually 4, erect, linear-oblong, concave, membranous, pubescent, incurved over the fruit but not completely concealing it. Stamen usually 1. Utricle small,

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North Strait, not uncommon near the [illegible]

3. **C. glaucum** *Linn. Sp. Plant.* (1753) 220. — A much-branched prostrate fleshy and succulent annual herb; branches widely spreading, flaccid, glabrous, striate, 4–18 in. long, rarely ascending at the tips. Leaves petiolate, the lo or rhomboid, us angularly sinua green and glabr smaller and nar arranged in sim usually more o short, obtuse a horizontal *Precur.* (18 (1853) 213 161; *Chees* (1810) 407.

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North [illegible] or sandy plac ber–March.

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See Aellen – Rev. der Australischen neuseelandischen Chenopodiaceen XI atriplex Bot. Jahrb. Engl. LXXI (2). 29: 1940: 229.

erect, ovate, compressed, the pericarp not adhering to the seed.—*Cheesem. Man. N.Z. Fl.* (1906) 582. C. pumilio *Hook. f. Fl. Nov. Zel.* i (1853) 214 (*not of R. Br.*).

North Island: Sandy shores of the east coast and Lake Taupo, *Colenso!* South Island: Near Nelson, *Captain F. W. Hutton!* Lake Lyndon (Canterbury), *J. D. Enys! T. Kirk! T. F. C.* Sea-level to 2500 ft.

I have had no opportunity of comparing this with the closely allied *C. pumilio* R. Br. from Australia. According to Hooker, it is mainly distinguished by the membranous perianth-segments.

3. **ATRIPLEX** Linn.

Herbs or shrubs, usually more or less mealy or scurfy-tomentose. Leaves alternate or rarely opposite. Flowers unisexual, usually in clusters arranged in simple or panicled spikes, the sexes distinct or mixed in the clusters. Male flowers ebracteate. Perianth 3–5-partite; segments oblong or obovate, obtuse. Stamens 3–5. Female flowers 2-bracteate; bracts small at first, erect and appressed, distinct or more or less connate, enlarged in fruit and forming a variously shaped 2-valved covering to the utricle. Perianth wanting or very rarely of 2–5 hyaline segments. Ovary small; styles 2, filiform. Utricle entirely concealed within the base of the greatly enlarged and thickened bracts; pericarp thin, membranous. Seed compressed, vertical or very rarely horizontal; testa thin, crustaceous or coriaceous; embryo annular, surrounding the copious mealy albumen.

A large genus of about 120 species, widely spread through most parts of the globe, but chiefly along sea-coasts or in saline localities. One of the New Zealand species is a weed of probably northern origin, two others are found in Australia, the fourth is endemic.

Erect branching shrub 1–4 ft. high, white with scurfy tomentum. Leaves 1–2 in., oblong, entire. Fruiting-bracts ¼ in., ovate-rhomboid	1. *A. cinerea.*
Erect or diffuse annual 1–2 ft. high, green or sparingly mealy. Leaves 1–3 in., lanceolate to deltoid, entire or toothed. Fruiting-bracts $\frac{1}{10}$–⅛ in., ovate-rhomboid	2. *A. patula.*
Prostrate, much branched, 3–9 in. diam., white with scurfy tomentum. Leaves ⅛–⅓ in., oblong to orbicular, entire or sinuate. Fruiting-bracts ovoid, very minute	3. *A. Buchanani.*
Prostrate, glabrous, fleshy, clothed with watery papillae, 6–18 in. long. Leaves ¼–¾ in., oblong, entire or toothed. Fruiting-bracts urceolate. Utricle transverse to the bracts, not parallel ..	4. *A. Billardieri.*

Nephrosia ulbrichiana Pflanzenfam. 520.

1. **A. cinerea** (*Poir.*) *Encycl. Suppl.* i (1810) 471.—A small branching shrub 1–4 ft. high, clothed in all its parts with densely appressed white or grey scurfy tomentum; stem woody; branches stout, angled, leafy. Leaves 1–2 in. long, linear-oblong or lanceolate, obtuse, narrowed into a short petiole, quite entire, midrib prominent beneath. Flowers dioecious or almost so; males in dense many-flowered simple or branched oblong spikes, which are often panicled at the ends of the branches. Females in small axillary clusters on the female plant, with occasionally 1 or 2 solitary in the axils of the upper leaves of the male plant. Fruiting-bracts greatly enlarged, about ¼ in. long, broadly ovate-rhomboid, subacute; disc thick and corky, swollen over the utricle, smooth or rarely tuberculate; margins thin. Utricle compressed, at the base of the bracts.—*Hook. f. Fl. Nov. Zel.* i (1853) 214; *Handb. N.Z. Fl.* (1864) 232; *Benth. Fl. Austral.* v (1870) 171; *Cheesem. Man. N.Z. Fl.* (1906) 583.

NORTH ISLAND: Wellington—Sandy shores of Palliser Bay, *Colenso!* SOUTH ISLAND: Vicinity of Nelson, *P. Lawson!* Also recorded from Canterbury, but I have seen no specimens from thence.

A common plant in many parts of Australia and Tasmania, and very closely allied to the European and African *A. Halimus* Linn.

2. **A. patula** *Linn. Sp. Plant.* (1753) 1053.—A very variable erect or decumbent or prostrate annual herb 1–2 ft. high, green and smooth, ...eolate to ... sinuate- ...ometimes ...er slender ...d female ...e axillary ...omboid or ... entire.— ...2; *Benth.*

Atriplex patula, Linn.

not native to N.Z. see T.N.Z.I.

vol. 57, p. 62. (Ckn. & Allan).

ATRIPLEX 408.

Aellen

1. Frucht. quer (transversel) zur Flache den Perianth blatter zurammengedrucht . . . . . Theleophyton T. billardieri (A.crystallina Hk.f.)
Frucht vertikal, quer oder parallel zur Flache der Perianth-blatter . . . 2.
2. Perianth mit arhangseln . . . . . 3.
" ohne anhangseln . . . . . 4.
3. Auhangsel geweiformig . . . A. cinerea
Auhangsel anders gehalnet . A. patula
4. Perianth sehr derb, zum Teil Korkig oder verholzend . . . . . A. cinerea
Perianth derbhantig, aber nicht verholzend . . . . . A. seinibaccata

A. semibaccata R.Br. Allen p.411.
Neu-Seeland, N.Is. Wgtn. Alkaline soil. Sea shore - sea level, 1909, H.H.Travers (Wien)

Allen, P., Revision der Australienden und Neuseelantichen Chenopodiacean XI Atriplex Bot. Jahrb. Eng. LXXI (2) No.29, 1920, pp. 228-232.

A. novae-zelandiae

...4 4 m. long, oblong or obovate, obtuse, entire or sinuate-toothed, very thick and fleshy. Flowers small, monoecious.

Atriplex crystallina = Theleophyton Billardieri 1809.
ullrich.

See Aellen – Res. der Australischen neuseelandischen Chenopodiaceen XI atriplex Bot. Jahrb. Engl. LXXI (2). 29: 1940 : 229.

erect, ovate, compressed, the pericarp not adhering to the seed.—*Cheesem. Man. N.Z. Fl.* (1906) 582. C. pumilio *Hook. f. Fl. Nov. Zel.* i (1853) 214 (*not of R. Br.*).

North Island: S[illegible] of the east coast and Lake Taupo, *Colenso!* South Island: Near N[illegible] Lake Lyndon (Canterbury), *J. D. Enys! T. Kirk!*

I have had no oppo
R. Br. from Australia.
branous perianth-segmer

Herbs or shrub
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1. **A.** shrub 1–
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solitary in the axils
greatly enlarged, about $\frac{1}{4}$ in. long,
disc thick and corky, swollen over the utricle, smooth
margins thin. Utricle compressed, at the base of the bracts.—*Hook. f. Fl. Nov. Zel.* i (1853) 214; *Handb. N.Z. Fl.* (1864) 232; *Benth. Fl. Austral.* v (1870) 171; *Cheesem. Man. N.Z. Fl.* (1906) 583.

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A common plant in many parts of Australia and Tasmania, and very closely allied to the European and African *A. Halimus* Linn.

2. **A. patula** *Linn. Sp. Plant.* (1753) 1053.—A very variable erect or decumbent or prostrate annual herb 1–2 ft. high, green and smooth, or sparingly mealy-white. Leaves petiolate, 1–3 in. long, lanceolate to broadly triangular-hastate, acute or obtuse, entire or coarsely sinuate-toothed; the uppermost often smaller and linear, the lowest sometimes opposite. Flowers small, monoecious, in clusters arranged in rather slender spikes, often forming narrow terminal panicles; the male and female flowers mixed or occasionally some of the females form separate axillary clusters. Male perianth small, 5-partite. Fruiting-bracts ovate-rhomboid or deltoid, acute, the disc smooth or tubercled; margins toothed or entire.—*Hook. f. Fl. Nov. Zel.* i (1853) 215; *Handb. N.Z. Fl.* (1864) 232; *Benth. Fl. Austral.* v (1870) 173; *Cheesem. Man. N.Z. Fl.* (1906) 584.

North and South Islands: Not uncommon in brackish-water swamps and other places near the sea from the Thames River southwards. December–March.

Now plentiful in almost all temperate parts of the world, either native or naturalized. How far it is indigenous in Australia and New Zealand is now very difficult to determine. The broad-leaved form known as var. *hastata* is the one most generally seen, but the more slender var. *littoralis* is also met with.

3. **A. Buchanani** *T. Kirk ex Cheesem. Man. N.Z. Fl.* (1906) 584.—An excessively branched prostrate herb, forming broad depressed greyish-white patches 3–9 in. across; stem woody at the base; branchlets slender, wiry, terete. Leaves shortly petiolate or almost sessile, $\frac{1}{8}$–$\frac{1}{3}$ in. long, oblong or oblong-ovate to suborbicular, rounded at the tip, quite entire, both surfaces densely clothed with white scurfy tomentum. Flowers minute, monoecious. Males in few-flowered clusters in the axils of the upper leaves or terminal, sometimes solitary. Perianth densely farinose, 5-partite; segments oblong, obtuse, incurved at the tip. Stamens 5, exserted; filaments filiform. Females solitary or in clusters of 2–5 in the lower axils, occasionally a few females at the base of the male clusters. Fruiting-bracts connate into an ovoid or almost urceolate 2-lipped cup. Utricle suborbicular, compressed, sunk within the base of the bracts.—Chenopodium Buchanani *T. Kirk in Trans. N.Z. Inst.* xxii (1898) 447, t. 32, f. 1.

Var. **tenuicaulis** *Petrie in Trans. N.Z. Inst.* xlvii (1915) 54.—Stems slender, erect or ascending, sparingly branched, 5–8 in. high, farinose above. Leaves few, distant, longer and narrower than in the type.

North Island: Sea-cliffs near Wellington, *Buchanan! T. Kirk!* South Island: Marlborough—The Brothers Rocks, *Robson!* Canterbury—Near the mouth of the Rangitata, *J. D. Enys!* Otago—Green Island and cliffs on the east coast, *Petrie!* saline places in the interior, Maniototo Plains, Ida Valley, Cromwell, *Petrie!* Sea-level to 1800 ft. December–March. Var. ***tenuicaulis:*** Centre Island (Foveaux Strait), *T. Kirk!* mouth of the Oreti River, *J. Crosby Smith!*

4. **A. crystallina** *Hook. f. in Lond. Journ. Bot.* vi (1847) 279.—A much-branched glabrous and succulent prostrate herb, everywhere covered with shining watery papillae; branches 6–18 in. long, spreading on all sides. Leaves shortly petiolate, $\frac{1}{4}$–$\frac{3}{4}$ in. long, oblong or obovate, obtuse, entire or sinuate-toothed, very thick and fleshy. Flowers small, monoecious.

Males fascicled at the tips of the branches, ebracteate. Perianth 5-partite; segments oblong, obtuse. Stamens 5, exserted; filaments filiform, connate at the very base. Females solitary or 2 together in the axils of the cauline leaves, minute, sessile. Fruiting-bracts combined into a shortly 2-lipped fleshy urceolate cup. Perianth wanting. Styles 2, filiform. Utricle included within the bracts, orbicular, compressed, its edges opposite to the bracts, not parallel, as is usual in the genus; pericarp very thin. Seed red-brown.—A. Billardieri *Hook. f. Fl. Nov. Zel.* i (1853) 215; *Fl. Tasm.* i (1860) 315, t. 95; *Handb. N.Z. Fl.* (1864) 232; *Benth. Fl. Austral.* v (1870) 180; *Cheesem Man. N.Z. Fl.* (1906) 584. Theleophyton Billardieri *Moq. in DC Prodr.* xiii, ii (1849) 115.

North Island: On sandy beaches, rare and local. Auckland—North Cape, *Buchanan!* Rangaunu Harbour, *H. Carse!* Takou Bay, *T. F. C.;* Whangaruru, *Colenso;* Great Barrier Island, Omaha, *T. Kirk!* between Tauranga and Maketu, *Spencer!* Matakana Island, *T. F. C.;* Anaura Bay (East Cape), *Bishop Williams!* Stewart Island: Paterson's Inlet, *Petrie! T. Kirk!* Chatham Islands: *Buchanan.* December–April.

A very remarkable species, differing from all others in the fruit being placed transversely to the bracts, not parallel. It is also found in Victoria and Tasmania.

4. **SALICORNIA** Linn. 1737.

Annual or perennial herbs, often woody at the base. Stems cylindric, jointed, erect or procumbent, usually much branched; branches opposite. Leaves succulent, opposite and decussate, the opposite pairs connate by their margins, thus forming joints or segments, each joint concave at the top and expanded into a kind of rim, the joint above sitting in the concavity thus formed. Inflorescence of terminal spikes. Flowers usually 3–5 together in the axils of the leaves or bracts, but the number varies from 3–12 or more in the New Zealand species. Perianth thin and membranous, 2–5-partite. Stamens 1–2. Styles 2. Utricle with a thick or thin testa, often covered with fine curved hairs.

A genus of about 25 species, abundant on salt marshes in most parts of the world. The single New Zealand species belongs to the subgenus *Arthrocnemum* Moquin, which is separated from *Salicornia* proper mainly by somewhat obscure embryological characters.

Until quite recently, *Salicornia* has been described as "leafless," and the green or reddish "joints" or "segments" were regarded as part of the succulent cortex. Thanks, however, to the researches of Douval-Jouve, it is now recognized that the "segments" are in reality fleshy internodes or leaf-bases, which carry on the assimilatory work of the plant. For information on this interesting point, reference should be made to Miss Ethel De Fraine's memoir on "The Anatomy of the Genus *Salicornia*" (Journ. Linn. Soc. Bot. xli (1913) 317); to Dr. Moss's paper "On Some Species of *Salicornia*" (Journ. Bot. xlix (1911) 177); and the Cambridge British Flora, vol. ii, p. 187 *et seq.*

1. **S. australis** *Soland. ex Forst. f. Prodr.* (1786) 88. 489.—Stems procumbent or almost prostrate below, sometimes woody at the base, usually 6–12 in. long, more rarely reaching 12–20 in.; branches numerous, jointed, ascending or erect. Joints $\frac{1}{4}$–$\frac{3}{4}$ in. long, $\frac{1}{8}$–$\frac{1}{4}$ in. diam., terete below, usually faintly compressed above, shortly 2-lobed at the tip, with a narrow thin and membranous margin. Flowering branches or spikes shorter and thicker than the ordinary branches, the joints much shorter, often broader than long. Flowers hermaphrodite or polygamous, sunk in the axils of the shortened leaf-bases (joints), usually from 5–10 in each axil, rarely as

many as 15, forming a more or less complete ring round the branch. Perianth very thick and fleshy, broad and flat and almost quadrangular at the top, narrower at the immersed base; mouth almost closed. Stamens 1 or 2. Utricle obliquely ovoid. Testa brown, coriaceous, covered with hooked hairs.—*Benth. Fl. Austral.* v (1870) 205; *Cheesem. Man. N.Z. Fl.* (1906) 585. S. indica *R. Br. Prodr.* (1810) 411 (*not of Willd.*); *A. Rich. Fl. Nouv. Zel.* (1832) 182; *A. Cunn. Precur.* (1838) n. 366; *Raoul Choix* (1846) 43; *Hook. f. Fl. Nov. Zel.* i (1853) 216; *Handb. N.Z. Fl.* (1864) 233.

North and South Islands, Chatham Islands: Abundant along the coast in salt marshes and saline places generally. Flowers through the summer and autumn.

5. **SUAEDA** Forsk. 1775.

Glabrous herbs or undershrubs. Leaves alternate, fleshy, thick or terete, entire. Flowers minute, sessile or nearly so, axillary, solitary or clustered, usually hermaphrodite; bracts and bracteoles minute, scarious. Perianth short, fleshy, 5-lobed or -partite; lobes or segments equal or unequal, without appendages or more or less carinate or crested or slightly winged, enclosing the fruit. Stamens 5, short. Styles 2–5, short, subulate, recurved. Utricle included in the perianth, membranous or spongy; pericarp thin, usually free from the seed. Seed horizontal, vertical or oblique; testa crustaceous or coriaceous; albumen wanting or scanty; embryo flat, spirally rolled.

A widely distributed genus of about 40 species, usually found on seashores or in saline places. The single species found in New Zealand has a wide range in most temperate and tropical countries.

1. **S. maritima** *Dum. Fl. Belg.* (1827) 22.—A much-branched glabrous erect or diffuse herb, varying in height from a few inches to nearly 2 ft.; stem often hard and almost woody at the base. Leaves sessile, $\frac{1}{4}$–$\frac{1}{2}$ in. long or more, linear, semi-terete or almost cylindric, acute or obtuse, thick and succulent. Flowers small, greenish, solitary or 2–4 together in the axils of the leaves, each flower usually with 1 bract and 2 bracteoles. Fruiting-perianth depressed, about $\frac{1}{12}$ in. diam., 5-lobed; lobes ovate-rounded, appressed to the utricle. Utricle membranous. Seed horizontal or very rarely vertical, dark red-brown, shining.—*Raoul Choix* (1846) 43; *Hook. f. Fl. Nov. Zel.* i (1853) 214; *Handb. N.Z. Fl.* (1864) 231; *Benth. Fl. Austral.* v (1870) 206; *Cheesem. Man. N.Z. Fl.* (1906) 586. Chenopodium maritimum *Linn. Sp. Plant.* (1753) 221; *A. Rich. Fl. Nouv. Zel.* (1832) 181; *A. Cunn. Precur.* (1838) n. 364. Salsola fruticosa *Forst. f. Prodr.* (1786) n. 131 (*not of Linn.*).

North and South Islands: Not uncommon in salt marshes from the North Cape to Foveaux Strait. December–March.

The Australian and New Zealand plant is sometimes separated from the northern form under the name of *S. australis* Moq., on account of its more suffrutescent habit, but it is very variable in this respect. Chen. Eng. 1846–72.

6. **SALSOLA** Linn. 1735.

Herbs or shrubs; branches not jointed. Leaves alternate, sessile, narrow-linear or terete, often pungent. Flowers small, solitary or fascicled, axillary, hermaphrodite, 2-bracteolate. Perianth 4–5-partite; segments

concave, thickened down the back, enlarged in fruit and furnished with a horizontal wing or protuberance, completely enclosing the utricle. Stamens 5, rarely fewer. Styles 2–3, subulate, erect or recurved. Utricle ovoid or orbicular; pericarp fleshy or membranous, not adherent to the seed. Seed usually horizontal, orbicular; testa membranous; albumen wanting; embryo spirally coiled.

Species estimated at about 40, widely spread in saline localities, but mainly in temperate regions.

1. **S. Kali** *Linn. Sp. Plant.* (1753) 222.—A rigid procumbent or diffusely branched herb 6–18 in. high; stem stout, grooved and angled, scabrid-pubescent or almost glabrous; branches spreading, often striped. Leaves spreading and recurved, variable in size, ¼–1 in. long or more, ovate-subulate with a rigid pungent point, sheathing at the base, thick and fleshy, semi-terete; the uppermost shorter and broader, almost triangular. Flowers solitary and sessile in the axils of the leaves, sometimes appearing clustered from the reduction of axillary flowering branches, each flower with 2 opposite bracteoles; floral leaves and bracteoles all pungent. Fruiting-perianth about ¼ in. diam., shorter than the bracteoles, 5-partite; segments rigid and cartilaginous at the base, furnished above with 5 broad spreading scarious wings.—*Benth. Fl. Austral.* v (1870) 207; *Cheesem. Man. N.Z. Fl.* (1906) 587. S. australis *R. Br. Prodr.* (1810) 411; *Hook. f. Fl. Nov. Zel.* i (1853) 216; *Handb. N.Z. Fl.* (1864) 232.

North and South Islands: Not uncommon on sandy shores from the North Cape southwards, but probably introduced. December–March.

A widely dispersed plant in most temperate and tropical regions, but of very doubtful nativity in New Zealand. It is a true native of Australia, however, having been gathered by Banks and Solander during Cook's first voyage.

Family XXXV. AMARANTACEAE.

Herbs, rarely shrubs. Leaves opposite or alternate, simple and entire, exstipulate. Flowers hermaphrodite or unisexual, usually regular, generally arranged in spikes or cymes or clusters, each flower seated within 2 scarious bracteoles and subtended by a larger scarious bract. Perianth inferior, persistent, rigid and scarious, often coloured, of 4–5 free or slightly connate segments, imbricate in bud. Stamens hypogynous, 4–5, seldom fewer, opposite to the sepals; filaments free or connate, or united with intervening staminodia into a cup-shaped ring; anthers 1- or 2-celled. Ovary superior, 1-celled; style long or short, simple or divided into 2–3 branches or separate styles; ovules 1 or more, attached to a slender basal funicle. Fruit usually a membranous utricle, rarely a capsule or berry, enclosed or resting upon the persistent perianth. Seeds 1 or more, usually compressed, vertical; albumen farinaceous; embryo annular or curved.

A moderate family, comprising 48 genera and nearly 500 species, most plentiful in tropical or warm countries, absent in cold climates or on the tops of high mountains. Some species of *Amarantus* and *Celosia* (cockscomb) are often cultivated in gardens, but as a whole the order is composed of weedy unattractive plants possessing no useful properties. The only New Zealand genus is found in all warm countries.

ALTERNANTHERA Forsk. 1775.

Annual or perennial herbs, usually prostrate or decumbent, rarely erect, glabrous or more or less pubescent or tomentose. Leaves opposite. Flowers small, whitish, capitate; heads sessile in the axils of the leaves, often clustered. Perianth 5-partite; segments unequal, the anterior and 2 posterior flattened, the 2 lateral innermost, concave. Stamens 2–5; filaments short, connate at the base into a membranous cup, with or without intervening staminodia; anthers 1-celled. Ovary orbicular or obovoid; style short or almost wanting; stigma capitellate or rarely 2-fid; ovule solitary, pendulous from an elongated basal funicle. Utricle compressed, ovoid or orbicular or obcordate; margins often thickened or winged. Seed vertical,

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North Island: Marshy places from the North Cape southwards to Rotorua and Hawke's Bay, rare and local to the south of Auckland. Sea-level to 1000 ft.

This was referred by Hooker to the widely distributed *A. sessilis* R. Br.; but later writers usually place it under *A. denticulata*, which is an abundant Australian plant.

Family XXXVI. **NYCTAGINACEAE.**

Herbs or shrubs or trees. Leaves opposite or less frequently alternate, simple, entire, exstipulate. Flowers hermaphrodite or unisexual, often involucrate, usually arranged in cymose panicles. Perianth inferior, petaloid, monophyllous; tube persistent and enveloping the fruit; limb with 3–5-plicate lobes. Stamens variable in number (1–30), usually 6–10, hypogynous; filaments often unequal, inflexed in bud; anthers didymous. Ovary superior, 1-celled; style simple, terminal; stigma small, entire or multifid; ovule solitary, basilar, erect. Fruit a utricle with a membranous pericarp, firmly enclosed in the thickened or hardened base of the perianth-tube, which falls off with it. Seed erect, with a thin adherent testa; albumen farinaceous or fleshy; embryo with foliaceous cotyledons usually wrapped round the albumen, radicle inferior.

A small family, of no economical importance, with the exception of 2 or 3 wide-ranging genera almost wholly confined to tropical America. Genera 23; species about 200. The single New Zealand genus is distributed over the shores of most tropical countries.

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Salsola kali, Linn.
not native to N.Z. see T.N.Z.I.
vol. 57, p. 67. (Ckn. & Allan).

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A small genus of 16 or 18 species, mainly tropical or subtropical, most abundant in America. The New Zealand species is a common weed in warm countries.

1. **A. denticulata** *R. Br. Prodr.* (1810) 417.—A prostrate or decumbent herb. Stems numerous from the root, branched, creeping and rooting, sometimes ascending at the tips, 4–18 in. long., glabrous or with 2 opposite pubescent lines. Leaves variable in size, $\frac{1}{2}$–3 in. long, linear-lanceolate to linear-oblong or oblong-obovate, obtuse or acute, narrowed to the base, entire or obscurely denticulate, glabrous or pubescent in the axils. Flowers aggregated in dense axillary clusters $\frac{1}{4}$–$\frac{1}{3}$ in. diam., minute, whitish, about $\frac{1}{12}$ in. long. Perianth-segments glabrous, rigid, acute. Stamens 2–3. Utricle broadly obcordate, with broad corky wings.—*A. Cunn. Precur.* (1838) n. 367; *Raoul Choix* (1846) 43; *Benth. Fl. Austral.* v (1870) 249; *Moq. DC. Prodr.* xiii, ii (1849) 356. A. sessilis *R. Br. Prodr.* (1810) 417; *Hook. f. Fl. Nov. Zel.* i (1853) 212; *Handb. N.Z. Fl.* (1864) 234; *Cheesem. Man. N.Z. Fl.* (1906) 577.

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A small family, of no economical importance, with the exception of 2 or 3 wide-ranging genera almost wholly confined to tropical America. Genera 23; species about 200. The single New Zealand genus is distributed over the shores of most tropical countries.

PISONIA Linn.

Trees or shrubs, usually unarmed, rarely spinous. Leaves opposite or scattered. Flowers unisexual or hermaphrodite, small, 2–3-bracteolate at the base, usually arranged in lax or dense cymose panicles. Perianth of the male flowers funnel-shaped or almost campanulate, of the females tubular, sometimes swollen at the base; limb 5-toothed; teeth short, induplicate-valvate, erect or patent. Stamens 6–10; filaments unequal, connate at the base into a tube or ring; anthers oblong or didymous, exserted or included. Ovary elongated, narrowed into a slender included or exserted style; stigma obliquely capitate or dilated, often fimbriate. Fruiting-perianth elongated or oblong, 5-ribbed or cylindrical, smooth or glandular-muricate, usually viscid, firmly enclosing the membranous utricle. Seed solitary, oblong, longitudinally grooved; embryo straight, the cotyledons convolute, enclosing the scanty albumen.

A large genus in tropical and subtropical America, with a few species in southern Asia, Australia, Polynesia, and the Mascarene Islands. The New Zealand species occurs in Norfolk Island and Australia, and may possibly have a wider range.

1. **P. Brunoniana** *Endl. Prodr. Fl. Norfl.* (1833) 43.—A glabrous shrub or small tree, usually 12–20 ft. high, but sometimes attaining 35 ft. with a trunk 2 ft. in diam.; wood soft, brittle. Leaves usually opposite, but often irregularly alternate or sometimes approximate in threes, petiolate, 4–15 in. long, oblong to ovate-oblong or elliptic-oblong, obtuse or subacute, quite entire, membranous and flaccid when young, but becoming firm in age. Cymes much branched, terminal, many-flowered. Flowers usually hermaphrodite, but sometimes the stamens are abortive. Perianth $\frac{1}{5}$ in. long, greenish, glabrous or puberulous, funnel-shaped with a campanulate mouth. Stamens 6–8; anthers equalling the perianth or slightly exserted. Fruit 1–$1\frac{1}{4}$ in. long, linear, narrowed above, 5-ribbed; ribs minutely papillose, extremely viscid.—*Hook. f. Handb. N.Z. Fl.* (1864) 229; *Benth. Fl. Austral.* v (1870) 280; *T. Kirk Forest Fl.* (1889) t. 140; *Cheesem. Man. N.Z. Fl.* (1906) 574. P. Sinclairii *Hook. f. Fl. Nov. Zel.* i (1853) 209, t. 50. P. Mooreiana *F. Muell. Fragm.* i (1858) 20.

Kermadec Islands: Not uncommon, *T. F. C., W. R. B. Oliver!* North Island: Three Kings Islands, *T. F. C.;* Whangape Harbour, *Berggren, McLennan!* between Whangarei and Ngunguru, *Colenso!* Hen and Chickens Islands, *T. Kirk! T. F. C.;* Cape Bream Tail, *R. Hastie;* Great Barrier Island, Arid Island, *T. Kirk!* Little Barrier Island, Cuvier Island, *T. F. C.;* Cabbage Bay, *Adams!* East Cape, *Bishop Williams!* Sea-level to 500 ft. *Parapara.* Flowers most of the year.

Also found in Norfolk Island, Lord Howe Island, New South Wales, and Queensland. The fruits are so excessively viscid that small birds, such as the white-eye (*Zosterops*) and fantail (*Rhipidura*), are often caught and glued down by the feathers, and fail to free themselves.

Family XXXVII. AIZOACEAE.

Annual or perennial herbs, rarely undershrubs, of very various habit. Leaves opposite or alternate or whorled, simple, often fleshy, stipules wanting or scarious. Flowers regular, usually hermaphrodite, solitary or fascicled or cymose. Calyx free or adnate to the ovary, 4–5 celled or -partite, imbricate. Petals either narrow and numerous, or 4–5 and small, or altogether wanting. Stamens perigynous or rarely hypogynous, few or many; filaments free or connate at the base. Ovary superior or

Heimerliodendron nov. nom.

In 1936 I established the new genus Heimerlia, based on Ceodes Brunoniana (Endl.) Skottsb. (Calpidia Brunoniana (Endl.) Heimerl: Sv. bot. tidskr. 30, p.738). The genus was named in honour of Dr. Anton Heimerl, well-known authority on the Nyctaginiaceae, with his kind permission. Unfortunately Dr. Heimerl, when he gave his consent, had forgotten that there already was a plant genus Heimerlia [illegible] o the Mycetozoa an[illegible] i professoris [illegible].s" (Heimerlia hyalina v. Höhn. Mycologici 1, 1903, p.391). Consequently, I had no reason to search the literature for a name Heimerlia. Some time ago I accidentally came across the name in A. & G. Lister's Monograph of the Mycetozoa (2nd ed., 1911, p.170), where H. hyalina is supposed not to belong to the Mycetozoa at all and suspected to be identical with another doubtful fungus, Endodromia vitrea Berk. 1841. In any case Heimerlia Skottsb. is a later homonym and has to be renamed. I call it Heimerliodendron, with the new combination H. Brunonianum (Endl.) Skottsb.

I shall use this occasion to correct a misprint in my paper referred to above: on p.738, last line, the signs o and ♀ have to change place.

C. Skottsberg.

Sartryck ur Svensk Botanisk Tidskrift. 1941. Bd.35, H.4.

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at the ba[illegible] prostrate or ascending. [illegible] floral feet [illegible]

Mesembryanthemum aequilaterale, Han.

not native to N.Z. see T.N.Z.I.

vol. 57, p. 66. (Ckn. & Allan).

J. Bot. (1932) 39.

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in Norfolk Island and Australia, and ma

Pisonia Brunoniana = Heimerlia Brunoniana

1. **P. Brunoniana** *Endl. Prodr.* [illegible] 10.—A glabrous shrub or small tree, usually 12–20 ft. high, but sometimes attaining 35 ft. with a trunk 2 ft. in diam.; wood soft, brittle. Leaves usually opposite, but often irregularly alternate or sometimes approximate in threes, petiolate, 4–15 in. long, oblong to ovate-oblong or elliptic-oblong, obtuse or subacute, quite entire, membranous and flaccid when young, but becoming firm in age. Cymes much branched, terminal, many-flowered. Flowers usually hermaphrodite, but sometimes the stamens are abortive. Perianth $\frac{1}{5}$ in. long, greenish, glabrous or puberulous, funnel-shaped with a campanulate mouth. Stamens 6–8; anthers equalling the perianth or slightly exserted. Fruit 1–$1\frac{1}{4}$ in. long, linear, narrowed above, 5-ribbed; ribs minutely papillose, extremely viscid.—*Hook. f. Handb. N.Z. Fl.* (1864) 229; *Benth. Fl. Austral.* v (1870) 280; *T. Kirk Forest Fl.* (1889) t. 140; *Cheesem. Man. N.Z. Fl.* (1906) 574. P. Sinclairii *Hook. f. Fl. Nov. Zel.* i (1853) 209, t. 50. P. Mooreiana *F. Muell. Fragm.* i (1858) 20.

Kermadec Islands: Not uncommon, *T. F. C., W. R. B. Oliver!* North Island: Three Kings Islands, *T. F. C.;* Whangape Harbour, *Berggren, McLennan!* between Whangarei and Ngunguru, *Colenso!* Hen and Chickens Islands, *T. Kirk! T. F. C.;* Cape Bream Tail, *R. Hastie;* Great Barrier Island, Arid Island, *T. Kirk!* Little Barrier Island, Cuvier Island, *T. F. C.;* Cabbage Bay, *Adams!* East Cape, *Bishop Williams!* Sea-level to 500 ft. *Parapara.* Flowers most of the year.

Also found in Norfolk Island, Lord Howe Island, New South Wales, and Queensland. The fruits are so excessively viscid that small birds, such as the white-eye (*Zosterops*) and fantail (*Rhipidura*), are often caught and glued down by the feathers, and fail to free themselves.

Fiziaceae

Family XXXVII. AIZOACEAE.

Annual or perennial herbs, rarely undershrubs, of very various habit. Leaves opposite or alternate or whorled, simple, often fleshy, stipules wanting or scarious. Flowers regular, usually hermaphrodite, solitary or fascicled or cymose. Calyx free or adnate to the ovary, 4–5 celled or -partite, imbricate. Petals either narrow and numerous, or 4–5 and small, or altogether wanting. Stamens perigynous or rarely hypogynous, few or many; filaments free or connate at the base. Ovary superior or

Heimerliodendron nov. nom.

In 1936 I established the new genus Heimerlia, based on Geodes Brunoniana (Endl.) Skottsb. (Calpidia Brunoniana (Endl.) Heimerl: Sv. bot. tidskr. 30, p.738). The genus was named in honour of Dr. Anton Heimerl, well-known authority on the Nyctaginiaceae, with his kind permission. Unfortunately Dr. Heimerl, when he gave his consent, had forgotten that there already was a plant genus Heimerlia v. Hohnel, a fungus referred to the Mycetozoa and dedicated "in honorem amicissimi professoris Antonii Heimerlii Vindobonensis" (Heimerlia hyalina v. Hohnel in Annales Mycologici 1, 1903, p.391). Consequently, I had no reason to search the literature for a name Heimerlia. Some time ago I accidentally came across the name in A. & G. Lister's Monograph of the Mycetozoa (2nd ed., 1911, p.170), where H. hyalina is supposed not to belong to the Mycetozoa at all and suspected to be identical with another doubtful fungus, Endodromia vitrea Berk. 1841. In any case Heimerlia Skottsb. is a later homonym and has to be renamed. I call it Heimerliodendron, with the new combination H. Brunonianum (Endl.) Skottsb.

I shall use this occasion to correct a misprint in my paper referred to above: on p.738, last line, the signs o and ♀ have to change place.

C. Skottsberg.

Sartryck ur Svensk Botanisk Tidskrift. 1941. Bd.35, H.4.

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at the base, prostrate or ascending ... -eral feet ...

Mesembryanthemum aequilaterale, Han.

not native to N.Z. see T.N.Z.I.

vol. 57, p. 66. (Ckn. & Allan).

J. Bot. Sl. Trans. (1932) 39.

Trees or shrubs,
scattered. Flowers
the base, usually a
the male flowers fun
sometimes swollen
valvate, erect or pa
base into a tube or
Ovary elongated,
stigma obliquely
elongated or oblon
usually viscid, fir
oblong, longitudin
enclosing the scan

A large genus ir
Asia, Australia, Poly
in Norfolk Island an

1. **P. Brunon**
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with a trunk 2 f
but often irregul
4–15 in. long, ob
quite entire, me
age. Cymes m
hermaphrodite,
long, greenish,
mouth. Stame
Fruit 1–1¼ in.
papillose, extre
Fl. Austral. v (
N.Z. Fl. (1906
P. Mooreiana

KERMADEC I
Three Kings Isl
Whangarei and
Cape Bream Tai
Island, Cuvier I
Sea-level to 500

Also found
land. The frui
(*Zosterops*) and
and fail to free

Annual
Leaves opp
wanting
fascicle
-partite
small,
few or

inferior, 2–5-celled; styles as many as the cells, free or united at the base; ovules either solitary in the cells and basal, or numerous and axile. Fruit generally a capsule with loculicidal or transverse dehiscence, more rarely drupaceous or separating into 1-seeded cocci. Seeds solitary or many, usually compressed; albumen scanty or copious; embryo slender, curved round the albumen, terete.

A large family, comprising 22 genera and nearly 500 species, mostly tropical or subtropical, and especially plentiful in South Africa; rare or absent in cold climates. The properties of the family are unimportant. Many species of *Mesembryanthemum* have showy flowers, and are cultivated in gardens; and *Tetragonia* is occasionally used as a pot herb. The remaining genera are mostly insignificant weeds. Both the New Zealand genera are widely distributed, although much more numerously represented in South Africa than elsewhere.

1. **MESEMBRYANTHEMUM** Linn.

More or less succulent herbs or undershrubs. Leaves usually opposite, thick and fleshy, trigonous or terete or flat. Flowers conspicuous, terminating the branches or axillary. Calyx-tube adnate with the ovary; lobes 5. Petals numerous, linear, in one or several rows. Stamens numerous, in many rows. Ovary inferior, with 5 or more cells, rarely 4-celled; styles as many as the cells, free or connate at the base, stigmatic on the inner side; ovules very numerous. Capsule enclosed in the persistent calyx, depressed at the apex and loculicidally dehiscent, the valves opening in a star-like manner. Seeds numerous, minute; testa crustaceous.

An enormous South African genus, containing fully 350 species; rare elsewhere, although a few species are widely scattered along the shores of many parts of the world.

Leaves less than 1 in. long. Flowers ¾–1 in. diam.; peduncles usually short .. .. 1. *M. australe.*
Leaves more than 1 in. long. Flowers 1½ in. diam., on long peduncles .. .. 2. *M. aequilaterale.*

Disphyma australe (G. Forst.) N.E.

1. **M. australe** *Sol. ex Forst. f. Prodr.* (1786) n. 523.—Stems 1–4 ft. long, prostrate and rooting at the nodes, woody, terete. Leaves opposite or in opposite fascicles, connate at the base, ½–1¼ in. long, linear or linear-oblong, triquetrous, flat above, convex and keeled beneath, acute or obtuse, thick and fleshy, often glaucous. Flowers ¾–1 in. diam., white or pink; peduncles usually shorter than the leaves, but sometimes nearly twice their length. Calyx-tube fleshy, obconic; lobes 5, 2 of them much longer than the others. Petals very numerous, spreading. Styles 5–8. Capsule 5–8-celled. — *A. Cunn. Precur.* (1839) n. 522; *Raoul Choix* (1846) 48; *Hook. f. Fl. Nov. Zel.* i (1853) 76; *Handb. N.Z. Fl.* (1864) 83; *Benth. Fl. Austral.* iii (1866) 324; *T. Kirk Students' Fl.* (1899) 184; *Cheesem. Man. N.Z. Fl.* (1906) 191.

Kermadec Islands, North and South Islands, Chatham Islands, Stewart Island: Common everywhere on rocky coasts. *Horokaka; New Zealand Ice-plant.* October–March. Also abundant in Australia and Tasmania, Norfolk Island, and Lord Howe Island.

1794?

2. **M. aequilaterale** *Haw. Misc. Nat.* (1803) 77.—Stems robust, woody at the base, prostrate or ascending, sometimes several feet in length; flowering branches short, suberect. Leaves opposite, stem-clasping, 1–3 in.

= Carpobrotus aequilaterum (Haw.) N.E. Br. J. Bot. 66: 324 (1928).
= " aequilateralis (Haw.) Black. Trans. R. Soc. Austr. 56 (1932) 39.

long, very fleshy, linear, acutely triquetrous, smooth, equal-sided or laterally compressed. Flowers 1½ in. diam.; peduncles 1–3 in. long, thickened upwards, winged. Calyx-tube turbinate, ½ in. long or more; lobes unequal, the 2 larger ones often as long as the tube. Petals spreading. Styles 6–10. Capsule 6–10-celled.—*DC. Prodr.* iii (1828) 429; *Benth. Fl. Austral.* iii (1866) 324; *T. Kirk Students' Fl.* (1899) 184; *Cheesem. Man. N.Z. Fl.* (1906) 191.

North Island: Coast near Napier; Castle Point, *T. Kirk!* December–February. A common plant in Australia and Tasmania, also found in California and Chile. I have seen no indigenous specimens.

2. **TETRAGONIA** Linn.

Herbs or undershrubs. Stems trailing or erect. Leaves alternate, petiolate, flat but more or less succulent. Flowers axillary, solitary or few together. Calyx-tube adnate to the ovary and often produced above it, terete or angled; lobes 3–5. Petals wanting. Stamens inserted on the calyx-tube, variable in number, solitary or few or many. Ovary inferior, 2–8-celled; styles as many as the cells; ovules solitary in each cell, pendulous. Fruit indehiscent, globose or obconic, often horned or tuberculate; endocarp hard or almost bony; epicarp coriaceous or fleshy.

A small genus of about 25 species, most of which are natives of South Africa, a few only being scattered over the coasts of America, Australasia, and parts of Asia.

Leaves 1–4 in. Fruit turbinate, hard, angular, horned above .. 1. *T. expansa.*

Leaves ¾–2 in. Fruit globose, succulent, not horned .. .. 2. *T. trigyna.*

1. **T. expansa** *Murr. in Comm. Gotting.* vi (1783) 13.—A more or less succulent minutely papillose herb. Stems 1–2 ft. high, decumbent or suberect, glabrous or sparingly puberulous. Leaves 1–4 in. long, ovate-rhomboid or triangular, obtuse or subacute, suddenly narrowed into the petiole, quite entire or very obscurely sinuate. Flowers small, yellowish, solitary or rarely 2 together, sessile or on very short peduncles. Calyx-tube broadly turbinate; lobes about as long as the tube, broad, obtuse. Stamens 12–20, irregularly inserted. Ovary 3–8-celled; styles the same number. Fruit about ⅓ in. long, hard and dry, almost turbinate, angular, usually furnished at the summit with 2–4 prominent teeth or horns.—*A. Rich. Fl. Nouv. Zel.* (1832) 320; *A. Cunn. Precur.* (1839) n. 523; *Raoul Choix* (1846) 48; *Hook. f. Fl. Nov. Zel.* i (1853) 77; *Handb. N.Z. Fl.* (1864) 84; *Benth. Fl. Austral.* iii (1866) 325; *T. Kirk Students' Fl.* (1899) 185; *Cheesem. Man. N.Z. Fl.* (1906) 192. T. halimifolia *Forst. f. Prodr.* (1786) n. 223.

Kermadec Islands, North and South Islands, Stewart Island: Not uncommon along the coasts; seldom found inland. *Kokihi.* November–February.

This has long been cultivated in Europe as an edible plant, under the name of "New Zealand spinach." It is also a native of Australia and Tasmania, Norfolk Island and Lord Howe Island, Japan, and extra-tropical South America.

2. **T. trigyna** *Banks and Sol. ex Hook. f. Fl. Nov. Zel.* i (1853) 77.—Stems 1–8 ft. long, branched, trailing or frequently climbing, terete, woody at the base. Leaves ¾–2 in. long, broadly ovate-rhomboid or rounded-ovate, obtuse, abruptly narrowed into the petiole, fleshy, usually covered with transparent papillae. Flowers small, yellowish, solitary or rarely

2 together; peduncles about as long as the flower. Ovary 2- rarely 3-celled; styles the same number as the cells. Fruit ¼ in. diam., subglobose, succulent, bright-red, obscurely lobed or quite even, not horned. Seeds 1–3.—*Hook. f. Handb. N.Z. Fl.* (1864) 84; *T. Kirk Students' Fl.* (1899) 185; *Cheesem. Man. N.Z. Fl.* (1906) 192. T. implexicoma *Hook. f. var.* chathamica *F. Muell. Veg. Chath. Is.* (1864) 12.

Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: In many places on the shores, but often local. November–February.

Easily distinguished from *T. expansa* by the trailing and often climbing habit, smaller broader leaves, and bright-red fleshy fruit. The flowers of both this species and *T. expansa* are frequently unisexual. It is very closely allied to the Australian and Tasmanian *T. implexicoma* Hook. f., but is said to differ in the broader leaves, broader and more unequal calyx-lobes, styles 3–4, and the fruit 3–4-celled.

Family XXXVIII. **PORTULACACEAE.**

Herbs, usually fleshy and glabrous, occasionally clothed with long hairs. Leaves opposite or rarely alternate, entire, generally exstipulate. Flowers regular, hermaphrodite. Sepals 2, rarely more, imbricate. Petals 4–5, hypogynous or rarely perigynous, free or united below. Stamens either equal in number to the petals and opposite to them or indefinite, often adnate to the base of the petals. Ovary free or rarely half-inferior, 1-celled; style 3–8-fid; ovules few or many, affixed to a free central or basal placenta. Fruit a capsule, either dehiscing with as many valves as style-branches, or opening by a transverse lid. Seeds 1 to many; embryo curved round a farinaceous albumen.

A small family, having its headquarters in America; found more sparingly in South Africa and Australia; decidedly rare in Asia, north Africa, and Europe. Genera 16; species about 225. Some of the American genera are shrubby; and the widely distributed *Portulaca* (naturalized in New Zealand) differs from the rest of the **family** in having perigynous petals and stamens, and a half-inferior ovary. Of the New Zealand genera, *Claytonia* is mainly American, and *Montia* occurs in the temperate regions of both hemispheres. I have followed Professor Ewart in transferring *Hectorella* to the *Caryophyllaceae*.

Stems slender. Stamens 5, opposite the petals. Capsule 3–many-seeded, seeds shining .. .. 1. Claytonia.
Stems slender. Stamens usually 3, opposite the petals. Capsule 1–3-seeded, seeds dull and opaque .. .. 2. Montia.

1. **CLAYTONIA** Linn.

Annual or perennial low-growing glabrous and succulent herbs. Radical leaves petiolate, cauline opposite or alternate. Flowers solitary or in terminal or axillary racemes or cymes. Sepals 2, persistent. Petals 5, hypogynous. Stamens 5, adhering to the petals at the base. Ovary free; ovules few; style 3-cleft. Capsule globose or ovoid, membranous, 3-valved. Seeds reniform or orbicular, flattened.

Species about 20, all from North America or north-eastern Asia with the exception of the following one, which is confined to Australia and New Zealand.

1. **C. australasica** *Hook. f.* in *Hook. Ic. Plant.* (1840) t. 293.—A perfectly glabrous tender and succulent usually matted plant, with slender creeping stems 1–6 in. long. Leaves very variable in size, ¼–1½ in. long, alternate

or in distant pairs, narrow-linear or linear-spathulate, obtuse, dilated into broad membranous sheaths at the base. Flowers large, $\frac{1}{4}$–$\frac{1}{2}$ in. diam., white or rose, terminal or leaf-opposed, solitary or in few-flowered lax racemes; pedicels long, slender. Sepals small, broadly orbicular. Petals much longer, broad-obovate. Capsule globose, mucronate, usually slightly exceeding the sepals. Seeds generally 3, black, smooth and shining.—*Fl. Nov. Zel.* i (1853) 73; *Handb. N.Z. Fl.* (1864) 26; *Benth. Fl. Austral.* i (1863) 177; *T. Kirk Students' Fl.* (1899) 65; *Cheesem. Man. N.Z. Fl.* (1906) 71.

North Island: Common on the high mountains of the interior; from Mount Egmont and Ruapehu southwards, ascending to over 6500 ft., *T. F. C.* and many others. South Island, Stewart Island: Common in mountain districts throughout, descending to sea-level in Otago and Stewart Island. An abundant plant in the mountains of south-eastern Australia and Tasmania.

A variable plant. When growing in dry or exposed places it is often very small and densely tufted; but in watery situations the stems lengthen out considerably and the leaves become longer. Mr. Buchanan (Trans. N.Z. Inst. iii (1871) 210) has described two varieties characterized by the peduncles in one being 2-flowered, and in the other racemose; but I find the number of flowers to be very inconstant.

2. **MONTIA** Linn.

A small glabrous herb. Leaves opposite, slightly fleshy. Flowers small, axillary or shortly racemose. Sepals 2, ovate, persistent. Petals 5, united at the base into a 5-lobed corolla, split open on one side. Stamens 3, rarely 5, inserted on the petals. Ovary free; ovules 3. Capsule globose, 3-valved, 3-seeded. Seeds nearly orbicular.

A monotypic genus, widely distributed in the North and South Temperate Zones.

1. **M. fontana** *Linn. Sp. Plant.* (1753) 87.—A slender perfectly glabrous branching herb, forming dense tufts 1–5 in. high, sometimes longer and weaker when growing in water. Leaves opposite, $\frac{1}{4}$–1 in. long, linear-lanceolate or spathulate, acute or subacute, quite entire. Flowers minute, solitary or in 2–3-flowered racemes, drooping. Petals slightly longer than the sepals. Capsules small.—*Hook. f. Fl. Antarct.* i (1844) 13; *Fl. Nov. Zel.* i (1853) 74; *Handb. N.Z. Fl.* (1864) 27; *T. Kirk Students' Fl.* (1899) 65; *Cheesem. Man. N.Z. Fl.* (1906) 72.

North and South Islands, Stewart Island, Auckland, Campbell, Antipodes, and Macquarie Islands: Abundant in watery places, from Rotorua and Taranaki southwards. Altitudinal range from sea-level to 5000 ft.

Family XXXIX. **CARYOPHYLLACEAE.**

Herbs, very rarely woody at the base; branches usually swollen at the nodes. Leaves opposite, quite entire or minutely serrulate, often united at the base; stipules scarious or wanting. Flowers regular, hermaphrodite. Sepals 4–5, free or cohering into a tubular calyx, imbricate. Petals 4–5 or occasionally absent, hypogynous or rarely perigynous, entire or lobed. Stamens 8–10, rarely fewer, inserted with the petals. Ovary free, 1-celled or imperfectly 3–5-celled at the base; styles 2–5, free or more or less connate into a single style; ovules 2 to many, attached to a free central or basal placenta. Fruit usually capsular, splitting into as

Parakeleba. Pflanzenf. 16c. 1934: 327 accept Arenaria truncata Col. as indigenous to N.Z.

many or twice as many valves as styles, very rarely indehiscent. Seeds few or many; albumen farinaceous, usually more or less surrounded by the narrow curved embryo.

A large and very natural family, found in every part of the world, but most abundant in temperate regions, particularly of the Northern Hemisphere; rare in the tropics, unless on high mountains. Genera about 55; species 1200 or more. The family contains some handsome garden-plants, as the various kinds of carnations and pinks, but as a whole the species are insignificant, possessing no important properties or uses. Of the 6 genera indigenous in New Zealand, *Hectorella* is endemic, *Colobanthus* is confined to the South Temperate Zone; the remaining 4 occur in both hemispheres. More than 20 naturalized species have become well established, all of them of northern origin.

Sepals united into a tubular calyx (Sileneae).

Calyx broadly 5-nerved. Styles 2. Capsule deeply 4-valved ..	1. GYPSOPHILA.

Sepals free (Alsineae).

Petals 2-fid. Styles 3–5. Capsule globular or ovoid, opening with as many valves as styles. No stipules	2. STELLARIA.
Petals wanting. Styles 4–5. Stamens equal in number to the sepals. No stipules	3. COLOBANTHUS.
Petals entire. Styles 3. Capsule 3-valved. Stipules scarious..	4. SPERGULARIA.
Alpine herbs with densely tufted stems. Stamens 5, alternate with the petals	5. HECTORELLA.
Densely tufted herbs. Petals wanting. Stamen usually 1 ..	6. SCLERANTHUS.

1. **GYPSOPHILA** Linn.

Annual or perennial herbs, often glaucous, sometimes glandular-pubescent or hispid. Flowers usually small, paniculate or solitary in the forks of the stem. Calyx campanulate or turbinate, 5-toothed or 5-lobed, with 5 broad green nerves separated by membranous interspaces. Petals 5, with a narrow claw; limb entire or notched. Stamens 10. Ovary 1-celled; styles 2; ovules many. Capsule globose or ovoid, 4-valved to or below the middle. Seeds subreniform, laterally attached, embryo curved round the albumen.

A genus of about 50 species, with the exception of the following one all limited to the Mediterranean region and extra-tropical Asia.

1. **G. tubulosa** *Boiss. Diagn. Fl. Or.* i (1842) 11.—A dichotomously branched erect or spreading annual 2–6 in. high, glandular-pubescent in all its parts, often viscid; stems and branches slender, terete. Leaves linear-

See also T. 43 (1913) 233.

Gypsophila tubulosa, Boiss.
not native to N.Z. see T.N.Z.I.
vol. 57, p. 65. (Ckn. & Allan).

But see Bunge in Bc. 1934: 332.

Nelson—Tarndale, *W. T. L. Travers.* Marlborough—*Buchanan.* Canterbury—Lake Forsyth, Lake Lyndon, *T. Kirk!* Rangitata Valley, *Sinclair* and *Haast;* Mackenzie Plains and Lake Tekapo, *T. F. C.;* Lake Ohau, *Haast.* Otago—Common in the interior, *Hector* and *Buchanan, Petrie!* Altitudinal range from sea-level to 3000 ft. November–January.

Also widely diffused in Australia, but found elsewhere only in south Europe and Asia Minor, from whence it was originally described. Several botanists have suggested

or in distant pairs, narrow-linear or linear-spathulate, obtuse, dilated into broad membranous sheaths at the base. Flowers large, $\frac{1}{4}$–$\frac{1}{2}$ in. diam., white or rose, terminal or leaf-opposed, solitary or in few-flowered lax racemes; pedicels long, slender. Sepals small, broadly orbicular. Petals much longer, broad-obovate. Capsule globose, mucronate, usually slightly exceeding the sepals. Seeds generally 3, black, smooth and shining.—*Fl. Nov. Zel.* i (1853) 73; *Handb. N.Z. Fl.* (1864) 26; *Benth. Fl. Austral.* i (1863) 177; *T. Kirk Students' Fl.* (1899) 65; *Cheesem. Man. N.Z. Fl.* (1906) 71.

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North and South Islands, Stewart Island, Auckland, Campbell, Antipodes, and Macquarie Islands: Abundant in watery places, from Rotorua and Taranaki southwards. A[illegible]

Herbs, the nodes united at hermaphrc

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Sepals united into a tubular calyx (Sileneae).

Calyx broadly 5-nerved. Styles 2. Capsule deeply 4-valved ..	1. Gypsophila.

Sepals free (Alsineae).

Petals 2-fid. Styles 3–5. Capsule globular or ovoid, opening with as many valves as styles. No stipules	2. Stellaria.
Petals wanting. Styles 4–5. Stamens equal in number to the sepals. No stipules	3. Colobanthus.
Petals entire. Styles 3. Capsule 3-valved. Stipules scarious..	4. Spergularia.
Alpine herbs with densely tufted stems. Stamens 5, alternate with the petals	5. Hectorella.
Densely tufted herbs. Petals wanting. Stamen usually 1 ..	6. Scleranthus.

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Annual or perennial herbs, often glaucous, sometimes glandular-pubescent or hispid. Flowers usually small, paniculate or solitary in the forks of the stem. Calyx campanulate or turbinate, 5-toothed or 5-lobed, with 5 broad green nerves separated by membranous interspaces. Petals 5, with a narrow claw; limb entire or notched. Stamens 10. Ovary 1-celled; styles 2; ovules many. Capsule globose or ovoid, 4-valved to or below the middle. Seeds subreniform, laterally attached, embryo curved round the albumen.

A genus of about 50 species, with the exception of the following one all limited to the Mediterranean region and extra-tropical Asia.

1. **G. tubulosa** *Boiss. Diagn. Fl. Or.* i (1842) 11.—A dichotomously branched erect or spreading annual 2–6 in. high, glandular-pubescent in all its parts, often viscid; stems and branches slender, terete. Leaves linear-subulate, $\frac{1}{6}$–$\frac{1}{2}$ in., rarely longer. Flowers solitary in the forks of the branches, sometimes appearing axillary from one branch only being developed; peduncles slender, $\frac{1}{4}$–$\frac{1}{2}$ in. long. Calyx tubular, with 5 short teeth. Petals red or whitish-red, linear-oblong, slightly exceeding the calyx. Capsule ovoid-oblong, longer than the calyx, 5-valved at the apex. Seeds black, transversely rugose and pitted.—*Hook f. Fl. Nov. Zel.* ii (1855) 325; *Handb. N.Z. Fl.* (1864) 22; *Benth. Fl. Austral.* i (1863) 155; *T. Kirk Students' Fl.* (1899) 54; *Cheesem. Man. N.Z. Fl.* (1906) 62.

See also T. 43 (1913) 233.

North Island: East coast, from Ahuriri to Cape Palliser, *Colenso!* South Island: Nelson—Tarndale, *W. T. L. Travers.* Marlborough—*Buchanan.* Canterbury—Lake Forsyth, Lake Lyndon, *T. Kirk!* Rangitata Valley, *Sinclair* and *Haast;* Mackenzie Plains and Lake Tekapo, *T. F. C.;* Lake Ohau, *Haast.* Otago—Common in the interior, *Hector* and *Buchanan, Petrie!* Altitudinal range from sea-level to 3000 ft. November–January.

Also widely diffused in Australia, but found elsewhere only in south Europe and Asia Minor, from whence it was originally described. Several botanists have suggested

that it has been introduced both into Australia and New Zealand, but so far as the latter country is concerned no evidence has ever been obtained in support of such a view. It seems highly improbable that a plant found only in south Europe and Asia Minor should arrive in Australia at a sufficiently early date to be detected by Robert Brown before 1805, and also travel to New Zealand, and become well established, before it was gathered by Mr. Colenso shortly after his arrival in 1834. On the assumption that it is a naturalized plant, it is also difficult to account for the fact that is has not further increased its range during the last fifty years.

2. STELLARIA Linn. 1753.

Annual or perennial herbs of very various habit, usually low-growing and diffuse, glabrous or pubescent. Flowers white, solitary or cymose, terminal or lateral. Sepals 5, rarely 4. Petals the same number, 2-cleft, rarely wanting. Stamens 10 or fewer by abortion, hypogynous. Ovary 1-celled; styles 3, or rarely 2, 4, or 5; ovules few or many. Capsule globose to oblong, few or many-seeded, dehiscing to below the middle into twice as many valves as styles. Seeds granulate, tuberculate, or pitted.

A genus of nearly 100 species, dispersed over the whole world, but most abundant in cold and temperate regions. The 6 indigenous species are all endemic, but 3 others from the Northern Hemisphere have become naturalized. One of these, *S. media* Linn., the common chickweed, is now so well established and has penetrated into such remote localities (it has been gathered in Macquarie Island) that a beginner will be certain to consider it indigenous. It has flaccid procumbent much-branched stems 6 in. to 2 ft. long, marked by an alternate pubescent line; ovate-acuminate leaves, the lower on long ciliate petioles; and flowers both axillary and in terminal cymes.

Creeping and matted. Leaves orbicular. Sepals subulate-lanceolate, acute	1. *S. parviflora.*
Creeping and matted. Leaves orbicular, ovate, obovate, or lanceolate. Sepals oblong-ovate, obtuse	2. *S. decipiens.*
Small. Leaves soft, ovate. Sepals oblong, obtuse	3. *S. minuta.*
Creeping or suberect. Leaves linear-oblong. Flowers almost sessile. Sepals ovate-lanceolate, acuminate	4. *S. elatinoides.*
Glaucous, erect, dichotomously branched. Leaves linear. Flowers large, green, ¾ in.	5. *S. Roughii.*
Tufted, suberect, rigid and wiry. Leaves acerose, linear-subulate	6. *S. gracilenta.*

1. **S. parviflora** *Banks and Sol. ex Hook. f. Fl. Nov. Zel.* i (1853) 25.—A slender pale-green flaccid herb with creeping stems rooting at the nodes, often much branched and forming broad matted patches 6–12 in. diam. or more, glabrous or with a few weak hairs on the petioles. Leaves membranous, $\frac{1}{4}$–$\frac{1}{2}$ in. long, orbicular or broadly ovate, acute or mucronate, rarely cordate at the base; blade usually longer than the petiole. Peduncles solitary, axillary, usually much longer than the leaves, 1–3-flowered; a pair of bracteoles at the fork of the peduncle, and another pair on one and sometimes on all the pedicels. Flowers minute, $\frac{1}{12}$ in. diam. Sepals subulate-lanceolate or oblong-lanceolate, acute, with white scarious margins. Petals wanting or 5, 2-cleft to nearly the base, shorter than the sepals. Styles 3. Capsule longer than the sepals, deeply 6-valved. Seeds 4–12, red-brown, deeply pitted.—*Hook. f. Handb. N.Z. Fl.* (1864) 23; *T. Kirk Students' Fl.* (1899) 57; *Cheesem. Man. N.Z. Fl.* (1906) 63. S. oligosperma *Col. in Trans. N.Z. Inst.* xviii (1886) 257. S. pellucida *Col. l.c.* xxvii (1895) 383. see Kew. Bc. 1934. 322.

North and South Islands, Stewart Island, Chatham Islands: Abundant throughout in both lowland and mountain districts, ascending to over 4000 ft.

Mr. Colenso's herbarium contains numerous examples of his *S. oligosperma* and *S. pellucida*, but I can find no characters to distinguish them from the ordinary form of the species, even as varieties.

2. **S. decipiens** *Hook. f. Fl. Antarct.* i (1844) 7.—A pale-green much and loosely branched decumbent herb, forming matted patches. Leaves $\frac{1}{4}$–$\frac{2}{3}$ in. long, orbicular or orbicular-ovate or broadly obovate, rather fleshy, acute or apiculate, with a callous tip, narrowed into a broad and slightly ciliate petiole. Peduncles axillary, usually 2-flowered, generally longer than the leaves; a pair of bracts at the fork of the peduncle and another on one of the pedicels. Flowers small, rather larger than those of *S. parviflora*. Sepals 5, oblong-ovate, obtuse or subacute. Petals 5, 2-cleft to the base, shorter than the sepals, often wanting. Capsules $\frac{1}{3}$ longer than the sepals, oblong-ovoid, deeply 6-valved. Seeds dark red-brown, tuberculate.—*Ic. Plant.* (1844) t. 680; *Handb. N.Z. Fl.* (1864) 23; *T. Kirk Students' Fl.* (1899) 57; *Cheesem. Man. N.Z. Fl.* (1906) 63; *Subantarctic Is. N.Z.* ii (1909) 401.

Var. **angustata** *T. Kirk l.c.*—Leaves narrower than in the type, linear-lanceolate, acute or acuminate.

Auckland and Campbell Islands: Woods near the sea, not uncommon, *Hooker, T. Kirk! Chapman!* Macquarie Island, *A. Hamilton.* Var. *angustata:* Antipodes Island, *T. Kirk!*

A larger plant than the preceding, with more fleshy stems and leaves, larger flowers, and larger and more coarsely tuberculate seeds. It much resembles the European *S. media*, but can always be distinguished by the less-developed inflorescence and by the absence of the pubescent line on the branches.

3. **S. minuta** *T. Kirk Students' Fl.* (1899) 57.—"Annual. Stems $\frac{1}{2}$–1 in. high, narrowly winged, branched, glabrous, ciliate. Leaves ovate, acuminate or acute, narrowed into a short broad petiole; apex callous. Peduncles axillary, 1–2-flowered, with a pair of bracts at the base of the naked pedicels, not diverging. Sepals broadly oblong, obtuse. Petals 5, shorter than the sepals, 2-fid nearly to the base. Stamens 8, rarely 10. Capsule not seen."—*Cheesem. Man. N.Z. Fl.* (1906) 64.

South Island: Mount Stokes, 3000 ft., *J. H. Macmahon!* Westport, on the sea-beach, *Dr. Gaze* (a scrap only).

The specimens of this in Mr. Kirk's herbarium are few and imperfect, and I have consequently reproduced his description. He remarks that it is "distinguished from all forms of *S. parviflora, S. decipiens*, and *S. elatinoides* by the broadly obtuse sepals, and from *S. media* by its solitary or geminate flowers and the absence of the hairy line on the stems and branches." It looks to me much like a reduced form of *S. parviflora*.

4. **S. elatinoides** *Hook. f. Fl. Nov. Zel.* i (1853) 25.—A small glabrous pale-green herb; stems 1–3 in. long, branched, decumbent at the base, ascending or suberect at the tips. Leaves $\frac{1}{10}$–$\frac{1}{5}$ in. long, linear or linear-oblong, acute or subacute, narrowed into a short flat petiole. Flowers small, $\frac{1}{10}$ in. diam., axillary and solitary, sessile or on short peduncles. Sepals ovate-lanceolate or subulate-lanceolate, acuminate, with white scarious margins. Petals absent in all the flowers examined. Stamens 5 or 10. Capsule ovoid, as long as the sepals, 6-valved to the middle. Seeds 6–12, red-brown, covered with large rounded tubercles.—*Handb. N.Z. Fl.* (1864) 23; *T. Kirk Students' Fl.* (1899) 58; *Cheesem. Man. N.Z. Fl.* (1906) 64.

North Island: Hawke's Bay—Lake Rotoatara and Cape Kidnappers, *Colenso.* South Island: Canterbury—Tussock-flats near Ashburton, *H. H. Allan!* Otago—Duntroon, Sowburn, Tuapeka Mouth, Speargrass Flat, *Petrie!* November.

Easily recognized by the small size, narrow leaves, acuminate sepals, almost sessile flowers, and coarsely tubercled seeds. The above description is drawn up from Mr. Petrie's Otago specimens, the plant not having been seen in the North Island since Mr. Colenso's original discovery of it more than sixty years ago. It is very closely allied to the Tasmanian *S. multiflora*, if, indeed, not a form of that species.

5. **S. Roughii** *Hook. f. Handb. N.Z. Fl.* (1864) 23.—An erect or straggling much-branched glabrous and succulent glaucous-green herb 2–6 in. high. Leaves $\frac{1}{2}$–1 in. long, linear, acuminate, fleshy, 1-nerved. Flowers large, green, $\frac{1}{2}$–$\frac{3}{4}$ in. long, $\frac{1}{2}$ in. diam., on short stout terminal peduncles. Sepals very large, almost foliaceous, lanceolate, acuminate, with 3 stout nerves. Petals much shorter than the sepals, cleft almost to the base. Stamens 10. Styles 3. Capsule about $\frac{1}{2}$ as long as the sepals, 6-valved to the base. Seeds 12–20, red-brown, covered with large projecting papillae.—*T. Kirk Students'* Fl. (1899) 58; *Cheesem. Man. N.Z. Fl.* (1906) 64; *Ill. N.Z. Fl.* i (1914) t. 18.

South Island: Nelson—Dun Mountain, *Rough! T. F. C.*; Wairau Gorge, *W. T. L. Travers*; Mount Captain, *T. Kirk!* Clarence Valley and Lake Tennyson, *T. F. C.* Canterbury—Mount Torlesse, *Haast, Petrie, T. F. C.*; Broken River and Upper Waimakariri, *J. D. Enys! T. Kirk! T. F. C.* Southland—Takitimo Mountains, *Crosby Smith.* Altitudinal range 3000–6000 ft. December–February.

A most distinct species. It has a very peculiar fleshy glaucous habit, and is remarkable for its large green flowers, the sepals being unusually long and consequently concealing the short white petals. It appears to be confined to bare shingle-slopes on the higher mountains.

6. **S. gracilenta** *Hook. f. Fl. Nov. Zel.* ii (1853) 326.—A loosely tufted rigid and wiry yellow-green herb 1–5 in. high; stems suberect, slightly scabrid, often matted and interlaced. Leaves opposite, glabrous, $\frac{1}{6}$–$\frac{1}{4}$ in. long, linear-subulate, curved, concave above, smooth and convex below when moist, when dry grooved on each side of the stout midrib; tip rigid, terete, acute; margins thickened, slightly ciliate at the base, not revolute; each stem-leaf with a small fascicle of leaves in its axil. Peduncles springing from the axils of the uppermost leaves, 1–3 in. long, solitary, strict, erect, 1-flowered, 2-bracteolate about the middle. Flowers $\frac{1}{3}$ in. diam., greenish-white. Sepals oblong, acute, with broad membranous margins. Petals 5, rather longer than the sepals, 2-cleft almost to the base. Stamens 5–10. Styles 3. Capsule ovate-oblong, 6-valved; seeds pale-brown, papillose.—*Handb. N.Z. Fl.* (1864) 24; *T. Kirk Students' Fl.* (1899) 58; *Cheesem. Man. N.Z. Fl.* (1906) 65; *Ill. N.Z. Fl.* i (1914) t. 19.

South Island: Not uncommon in mountain districts ascending to 5000 ft. Descends to sea-level at the mouth of the Waitaki River. November–February.

Easily recognized by the strict wiry habit, subulate leaves, and very long erect peduncles.

3. **COLOBANTHUS** Bartling. 1830.

Small densely tufted usually rigid glabrous herbs. Leaves opposite, narrow-linear or subulate, usually imbricate, rigid, cartilaginous, rarely fleshy. Flowers green, solitary, on short or long peduncles. Sepals 4–5, coriaceous, erect. Petals wanting. Stamens 4–5, alternating with the sepals, slightly perigynous. Capsule ovoid or oblong, opening by as many valves as sepals.

A genus of about 20 species, most numerous in New Zealand, but found also on the mountains of South America, in Australia and Tasmania, and in the Antarctic islands. Of the 11 species found in New Zealand, 2 are also found in South America, 1 is said to occur in Australia and Tasmania, and the remaining 8 are endemic.

Colobanthus repens Col. in Trans. N.Z. Inst. xix (1887) 261 and *C. caespitotus* Col. *l.c.* xxvii (1895) 384 are respectively *Sagina procumbens* Linn. and *S. apetala* Linn., as proved by the type specimens in Mr. Colenso's herbarium. It is curious that such an

acute observer as Mr. Colenso should have overlooked that the stamens are opposite to the sepals in both these plants, and not alternate, as in the case in all true *Colobanthi*. Both the above species of *Sagina* are now copiously naturalized throughout the Dominion.

* Flowers tetramerous.

Soft, bright-green. Leaves $\frac{1}{10}$–$\frac{1}{4}$ in., linear, obtuse, almost fleshy. Sepals ovate-lanceolate, obtuse	1. *C. muscoides.*
Branched, leafy. Leaves flaccid, $\frac{1}{4}$–$\frac{2}{3}$ in., acute or mucronate, not acicular. Sepals ovate, obtuse	2. *C. quitensis.*
Leaves spreading, margins thickened. Sepals linear-subulate. Flowers lateral, axillary	3. *C. monticola.*

** Flowers pentamerous.

Leaves loosely imbricate, spreading or recurved, chaffy, acute or shortly acicular. Sepals ovate, acute, about equal to the capsule	4. *C. canaliculatus.*
Leaves grassy, often flaccid, acicular. Sepals ovate, acute or acuminate, but slightly exceeding the capsule	5. *C. crassifolius.*
Leaves rigid, spreading, acicular, much longer than the capsule ..	6. *C. Muelleri.*
Leaves densely imbricated, small, $\frac{1}{10}$–$\frac{1}{5}$ in., obtuse at the tip, with a short acicular point. Sepals about equal to the capsule ..	7. *C. brevisepalus.*
Leaves densely imbricate, $\frac{1}{6}$–$\frac{1}{4}$ in., strict, narrowed into short acicular points. Sepals about equal to the capsule	8. *C. Hookeri.*
Leaves short, strict, erect; calyx broad, the sepals narrowed into long acicular points	9. *C. strictus.*
Leaves densely imbricate, $\frac{1}{4}$–$\frac{3}{4}$ in., curved, narrowed into very long acicular points. Sepals much longer than the capsule ..	10. *C. acicularis.*
Leaves barely imbricate, laxly spreading, membranous, $\frac{1}{4}$–$\frac{1}{2}$ in. long. Peduncles axillary. Sepals linear-subulate, much longer than the capsule	11. *C. Buchanani.*

1. **C. muscoides** *Hook. f. Fl. Antarct.* i (1844) 14.—A soft almost flaccid perfectly glabrous densely tufted bright-green plant, forming large irregular patches. Stems numerous, branched, densely matted and compacted. Leaves closely imbricated, connate at the base, spreading or ascending, $\frac{1}{10}$–$\frac{1}{4}$ in. long, linear from a broad base, obtuse at the tip. Flowers minute, on short peduncles which are sunk amongst the uppermost leaves or shortly exserted in fruit. Sepals 4, ovate-lanceolate, obtuse, concave, obscurely keeled at the back. Capsule shorter than the sepals.—*Handb. N.Z. Fl.* (1864) 25; *T. Kirk Students' Fl.* (1899) 62; *Homb. and Jacq. Voy. au Pôle Sud Bot.* (1852) t. 17; *Cheesem. Man. N.Z. Fl.* (1906) 66.

The Snares, Auckland, Campbell, Antipodes, and Macquarie Islands: Common on rocks near the sea.

Forms rounded patches sometimes 18 in. across, although usually much smaller, the inner part composed of the decaying foliage and stems of old plants, the outside thickly covered with the compacted stems and branches, clothed with bright-green leaves.

C. mollis Oliv. TNZI 56 (1926) 5.

2. **C. quitensis** *Bartl. in Presl Reliq. Haenk.* ii (1830–36) 13, t. 49, f. 2.—A small densely tufted much-branched plant 1–2 in. high, forming rather soft rounded patches. Leaves variable in size, lower sometimes over $\frac{1}{2}$ in. long, upper often very small, $\frac{1}{8}$–$\frac{1}{4}$ in., narrow-linear or linear-subulate, acute or mucronate but not acicular at the tip, connate at the base, flat or concave above, convex beneath; texture soft. Peduncles short, stout, terminal. Flowers $\frac{1}{8}$–$\frac{1}{6}$ in. long. Sepals 4, ovate, broad at the base, obtuse at the tip, rather thick. Capsule $\frac{1}{3}$ shorter than the sepals.—*Hook. f. Handb. N.Z. Fl.* (1864) 24; *T. Kirk Students' Fl.* (1899) 60; *Cheesem. Man. N.Z. Fl.* (1906) 66.

South Island: Nelson—Dun Mountain Range, Mount Arthur, Ragian Mountains, *T. F. C.*; Wairau Mountains, *W. T. L. Travers.* Canterbury—Kowai River, *Haast.* Otago—*Buchanan!* Altitudinal range 1500 ft. to 4500 ft. Also in South America, from Mexico to Cape Horn.

A well-marked species, at once recognized by the soft leaves, which never have acicular points, by the tetramerous flowers, and by the broad obtuse sepals.

3. **C. monticola** *Petrie in Trans. N.Z. Inst.* xliv (1912) 179.—A small densely tufted much-branched plant, forming rounded cushions 1–2 in. diam., perfectly glabrous in all its parts. Leaves closely imbricate all round the branches, spreading, the opposite pairs connate at the base, $\frac{1}{6}$–$\frac{1}{3}$ in. long, linear-subulate, thin and membranous at the base, gradually narrowed upwards into a short acicular point, margins conspicuously thickened, channelled above, convex beneath, veinless. Flowers on short axillary peduncles near the tips of the branchlets, the peduncles elongating in fruit. Sepals 4, linear-subulate, acicular. Stamens 4, barely $\frac{1}{2}$ the length of the sepals. Styles 4. Capsule 4-celled, equalling the calyx when mature.

South Island: Rocky faces of the Sealey Range, Mount Cook district, alt 5500 ft., *Petrie*; Hooker Valley, 3000 ft., *T. F. C.*

Closely related to *C. canaliculatus*, but easily separated by the smaller size, tetramerous flowers, much narrower sepals, and shorter stamens and styles.

4. **C. canaliculatus** *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 357.—A small densely tufted much-branched plant, forming rounded cushions 3–4 in. diam. and 2 in. high, occasionally more laxly branched and open. Leaves in opposite pairs with broad connate sheathing bases, $\frac{1}{8}$–$\frac{1}{5}$ in. long, rigid or chaffy, spreading, subulate, gradually narrowed into an acute or shortly acicular tip, deeply channelled above, convex below, margins thickened. Flowers $\frac{1}{6}$ in., terminating short lateral branchlets in the axils of the uppermost leaves. Sepals 5, broadly ovate, acute or subacute, margins thin and almost translucent. Stamens 5, longer than the sepals. Hypogynous disc reduced to a thickened line. Capsules equal to or rather shorter than the sepals.—*Students' Fl.* (1899) 61; *Cheesem. Man. N.Z. Fl.* (1906) 69. C. squarrosus *Cheesem. in Trans. N.Z. Inst.* xxviii (1896) 534.

South Island: Nelson—Mount Owen, on limestone rocks, alt. 4000 ft., *T. F. C.*, *W. Townson!* Otago—*Buchanan.*

A well-marked plant, the chief characters of which are the short spreading chaffy leaves, either acute or very shortly acicular, the short stout lateral peduncles, and the broadly ovate sepals.

5. **C. crassifolius** *Hook. f. Fl. Antarct.* ii (1847) 248.—A small densely tufted perennial $\frac{1}{2}$–$1\frac{1}{2}$ in. high, rarely more. Leaves in crowded tufts, usually grassy, often flaccid, very variable in length, sometimes 1 in. long, very narrow-linear or filiform, at other times shorter, $\frac{1}{4}$ in., linear-subulate; broad and membranous at the base and sheathing the stem, gradually narrowed upwards, acute or acicular at the tip. Peduncles springing from the centre of the leaf-tufts, longer or shorter than the leaves, usually elongating in the fruiting stage. Sepals 5, ovate, acute or acuminate, as long as or rather longer than the capsule. Capsule broadly ovoid, obtuse.—C. Billardieri *Fenzl. in Ann. Wien Mus.* i (1836) 49 (*in part*); *Hook. f. Fl. Antarct.* i (1844) 14; *Fl. Nov. Zel.* i (1853) 27; *Fl. Tasm.* i (1860) 45; *Handb. N.Z. Fl.* (1864) 25; *Benth. Fl. Austral.* i (1863) 161; *T. Kirk Students' Fl.* (1899) 60; *Cheesem. Man. N.Z. Fl.* (1906) 67.

Var. **alpinus** *T. Kirk l.c.* — Larger, forming tufts sometimes 4 in. diam. Leaves 1–2 in., with acicular tips. Peduncles 2–4 in. long in fruit. Sepals ovate, acuminate, rather longer than the capsule.

North Island: From Mount Egmont, Tongariro and Ruapehu, and Mount Hikurangi, southwards along the Kaimanawa Mountains, the Ruahine Range, and the Tararua Mountains. South Island, Stewart Island, Chatham Islands, Auckland and Campbell Islands, Antipodes Island, Macquarie Island: Altitudinal range from sea-level to 5000 ft.

C. crassifolius is usually considered to be the same as a Victorian and Tasmanian plant. But Dr. Skottsberg, who is well acquainted with the genus, has lately reaffirmed its distinctness. He unites the New Zealand plant with the Fuegian and Antarctic *C. crassifolius*, and I am following his views in this place.

C. crassifolius is separated from *C. quitensis* by the different habit, acicular tips to the leaves, pentamerous flowers, and pointed sepals. From *C. Muelleri* it can be distinguished by the grassy and often flaccid leaves and shorter sepals, which last are not acicular; but some forms are very difficult to place.

6. **C. Muelleri** *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 356.—A small densely tufted perfectly glabrous plant, $\frac{1}{4}$–$1\frac{1}{2}$ in. high. Leaves rigid, cartilaginous, spreading, often recurved, $\frac{1}{4}$–$\frac{3}{4}$ in. long, linear-subulate, broadly channelled above, convex below, narrowed into short acicular tips. Peduncles terminal or lateral, $\frac{1}{4}$–$\frac{3}{4}$ in. long, stout, often hidden among the leaves. Sepals 5, ovate or ovate-lanceolate, suddenly narrowed into cartilaginous points with acicular tips, about $\frac{1}{3}$ longer than the capsule.—*Students' Fl.* (1899) 60; *Cheesem. Man. N.Z. Fl.* (1906) 67. C. Billardieri *var.* brachypoda *F. Muell. Veg. Chath. Is.* (1864) 11.

? Var. **multicaulis** *T. Kirk Students' Fl.* (1899) 61. — Rigid, much branched, branches naked below. Leaves rather lax, spreading, linear-subulate, $\frac{1}{4}$ in. long. Peduncles about as long as the leaves. Sepals narrow-ovate, acute or mucronate, equalling the capsule.

North and South Islands, Stewart Island, Chatham Islands: The typical form not uncommon from Manaia (Taranaki), *Mrs. F. Mason!* and the East Cape southwards, usually on cliffs and shingly beaches. Var. *multicaulis:* Interior of Otago, *Buchanan!*

A puzzling plant. As characterized above, it is distinguished from *C. Billardieri* by the rigid habit, harsh often cartilaginous leaves, and especially by the rigid acicular sepals, which are much longer than the capsule. The var. *multicaulis* is only known from a mere scrap collected somewhere in Central Otago by Mr. Buchanan, and probably does not belong to this species.

7. **C. brevisepalus** *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 357, t. 27E.—A small densely tufted much-branched plant, forming compact rounded cushions 1–2 in. diam. Leaves densely imbricated, straight or curved, smooth and shining, $\frac{1}{8}$–$\frac{1}{5}$ in. long, base broad and membranous, sheathing the stem, suddenly narrowed into the upper part, which is subulate, concave above, convex below, obtuse and almost tumid at the tip, abruptly produced into a short acicular point. Flowers terminal, sunk amongst the leaves. Sepals 5, ovate-subulate, convex or almost keeled, equalling or slightly longer than the oblong capsule.—*Students' Fl.* (1899) 61; *Cheesem. Man. N.Z. Fl.* (1906) 68.

South Island: Marlborough—Mount Blairich, *J. H. Macmahon!* Mount Mowatt, *T. Kirk!* Canterbury—Lake Heron and Mount Arrowsmith, *Cockayne;* Mount Dobson and other mountains near Lake Tekapo, *T. F. C.* Otago—Kurow, Speargrass Flat, Cromwell, Queenstown, *Petrie!* Eyre Mountains, *Poppelwell.* Ascends to 6000 ft.

This appears to be a well-marked form, recognized without any difficulty by the short densely imbricated leaves with obtuse tips furnished with a fine hair-point.

8. **C. Hookeri** *Cheesem. in Trans. N.Z. Inst.* liii (1921) 425.—A small densely tufted moss-like plant, forming small rounded patches 1–1½ in. high, smooth and glabrous in all its parts. Leaves closely imbricate, ⅙–¼ in. long, strict and rigid, subulate, tapering from the base to a shortly acicular apex, channelled above, convex below, sometimes with a groove between the midrib and the margin. Flowers terminal, solitary; peduncles short, the flowers slightly exceeding the uppermost leaves. Sepals 5, ovate-subulate, thickened at the base, acute or very shortly mucronate, equalling or very slightly exceeding the capsule. Stamens always 5.—Colobanthus subulatus *Hook. f. Fl. Antarct.* i (1844) 13 (*but not* Sagina subulata *D'Urv. Fl. Ins. Mal.* (1826) 617); *Handb. N.Z. Fl.* (1864) 25; *nor* C. Benthamianus *Fenzl. in Ann. Wien Mus.* i (1838) 49.

Auckland and Campbell Islands: *Hooker, T. Kirk! B. C. Aston!*

In the "Subantarctic Islands of New Zealand" (ii, p. 402) I pointed out that the plate of *C. subulatus* given in the "Flora Antarctica" (ii, t. 47) represents a plant with a much more lax habit than the Auckland Islands or Campbell Island species, and that the sepals were only four in number, instead of five. I have therefore separated the New Zealand plant as a distinct species.

I have not seen any South Island specimens that I can refer to this species, although three are quoted by Hooker. Possibly they represent small states of *C. acicularis.*

9. **C. strictus** *Cheesem. in Trans. N.Z. Inst.* liii (1921) 424.—A perfectly glabrous and densely tufted rigid plant, forming hemispherical cushions 1–3 in. diam. Leaves numerous, densely imbricated all round the branches, straight or slightly curved, strict, erect, broad and membranous and sheathing the branch at the base, above rigid and coriaceous and gradually narrowed into a straight acicular apex, channelled above, convex beneath. Peduncles terminating the branchlets, stout, shorter than the leaves, stiffly erect. Sepals 5, broadly ovate at the base, suddenly narrowed into long acicular points ½ as long again as the capsule.—C. Muelleri *var.* strictus *Cheesem. Man. N.Z. Fl.*(1906) 68.

South Island: Upper Clarence Valley, *T. F. C.*; shingly flats in the Tasman and Hooker Valleys, *T. F. C*; Dunstan Mountains, *Petrie!* Altitudinal range 2500–3500 ft.

In the first edition of this work I treated this as a variety of *C. Muelleri.* But since then I have had opportunities of studying it in the Mount Cook district, where it is not uncommon, and have now no hesitation in constituting it a distinct species. It is mainly distinguished by the short strict erect leaves, and broad calyx-lobes, which are suddenly narrowed into long acicular points, much exceeding the capsule.

10. **C. acicularis** *Hook. f. Handb. N.Z. Fl.* (1864) 25.—A perfectly glabrous densely tufted rigid and shining plant, forming green or brownish rounded tufts 3–6 in. diam. and 1–3 in. high. Leaves very numerous, densely imbricated all round the branches, ¼–¾ in. long, linear-subulate, often curved, broad and sheathing at the base, gradually narrowed into very long acicular points, channelled above, convex and smooth below. Flowers almost sessile amongst the uppermost leaves, than which they are shorter. Sepals 5, narrow linear-subulate, narrowed into long acicular tips, at least ⅓ longer than the capsule.—*T. Kirk Students' Fl.* (1899) 62; *Cheesem. Man. N.Z. Fl.* (1906) 66; *Ill. N.Z. Fl.* i (1914) t. 20A.

South Island: Dry rocky places in the mountains, abundant throughout. Altitudinal range from 1500 to 6000 ft.

Well characterized by the robust stems and branches, long leaves with remarkably long acicular points, almost sessile flowers, and long sepals, which much exceed the capsule.

11. **C. Buchanani** *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 358, t. 27D.—Apparently a laxly tufted plant 2–3 in. high, with slender erect stems. Leaves not imbricating, loosely spreading, $\frac{1}{4}$–$\frac{1}{2}$ in. long, linear-subulate, sheathing at the base, membranous, concave above, convex below, gradually narrowed into short acicular points. Peduncles axillary, slender, usually rather longer than the leaves. Flowers $\frac{1}{5}$–$\frac{1}{4}$ in. long. Sepals 5, linear-subulate, acuminate, $\frac{1}{2}$ as long again as the short capsule.—*Students' Fl.* (1899) 62; *Cheesem. Man. N.Z. Fl.* (1906) 69.

South Island: Otago—Manuherikia Valley, *Buchanan!*

A most distinct plant, of which I have only seen three imperfect specimens. The slender stems, loosely spreading membranous leaves, and axillary peduncles give it a very different aspect from that of any other New Zealand species.

4. SPERGULARIA Pers. 1819.

Spreading or prostrate herbs. Leaves linear or setaceous, often with smaller ones fascicled in the axils so as to appear verticillate. Stipules small, scarious. Flowers white or pink, pedicelled, in subracemose cymes. Sepals 5. Petals 5, entire, rarely wanting. Stamens 10 or fewer by abortion. Ovary 1-celled, many-ovuled; styles 3. Capsules 3-valved; seeds compressed, often winged.

A genus of 5 or 6 species, widely spread in temperate or subtropical regions, chiefly near the sea-coast or in saline localities. The single New Zealand species has a very extensive range.

1. **S. media** (L.) *Presl Fl. Sic.* (1826) 17.—A rather succulent much-branched prostrate or suberect herb, more or less viscid-pubescent; stems 2–6 in. long. Leaves narrow-linnear, semi-terete, $\frac{1}{3}$–1 in. long, fleshy, quite entire, acute; stipules broadly ovate, acuminate, conspicuous. Flowers many, axillary and terminal, on slender glandular peduncles $\frac{1}{3}$–1 in. long. Sepals lanceolate, with a broad white membranous border. Petals usually shorter than the sepals. Capsule exceeding the sepals. Seeds more or less flattened, often surrounded by a broad membranous wing.—*T. Kirk Students' Fl.* (1899) 63; *Cheesem. Man. N.Z. Fl.* (1906) 70. S. rubra *var.* marina *Hook. f. Handb. N.Z. Fl.* (1864) 25. Arenaria media *Linn. Sp. Plant.* (1753) 606; *A. Cunn. Precur.* (1839) n. 609; *Hook. f. Fl. Nov. Zel.* i (1853) 26.

North and South Islands, Stewart Island: Common on the coast, from the Three Kings Islands and the North Cape southwards. October–February. An abundant plant near the sea in many parts of the world.

The allied species *S. rubra* Presl, which has more slender and flatter leaves, smaller flowers, and seeds not so conspicuously margined, is naturalized in several places in both the North and South Islands, but is usually found in inland localities.

5. HECTORELLA Hook. f. 1864

A small densely tufted glabrous perennial. Leaves small, densely imbricated, coriaceous, entire. Flowers almost sessile amongst the uppermost leaves. Sepals 2, short, truncate. Petals 5, connate at the base, thickened below the tip. Stamens 5, inserted on the tube of the corolla, and alternate with the petals; anthers linear-oblong. Ovary free; ovules 4–5, erect from the base of the cell; funicles slender; style erect; stigmas 1–3, linear, papillose. Capsule membranous, equalling the sepals; seeds 2–4.

A monotypic genus confined to New Zealand; not closely allied to any other.

1. **H. caespitosa** *Hook. f. Handb. N.Z. Fl.* (1864) 27.—Stems short, stout, densely tufted, with the leaves on almost as thick as the little finger, forming compact rounded cushions 2–8 in. diam. and 1–3 in. high. Leaves very numerous, closely imbricated in many series, $\frac{1}{6}$–$\frac{1}{3}$ in. long, broadly triangular-ovate to linear-oblong with a broad base, thin and membranous below the middle, coriaceous and keeled above; margins and tip thickened; veins reticulated. Flowers small, white, very shortly peduncled, forming a ring round the top of the branches among the uppermost leaves, often unisexual, the staminate ones being the smallest. Sepals concave, keeled. Petals much longer than the sepals. Capsule globose, membranous, as long as the sepals. Seeds 2–4, broadly ovoid, smooth and shining.—*Hook. f. in Ic. Plant.* (1867–71) t. 1046; *T. Kirk Students' Fl.* (1899) 65; *Cheesem. Man. N.Z. Fl.* (1906) 72. H. elongata *Buch. in Trans. N.Z. Inst.* xvi (1884) 395, t. 35.

South Island: Canterbury—Mountains above Arthur's Pass, *T. F. C.*; Upper Waimakariri, *Cockayne*; Mount Arrowsmith, *Cockayne* and ***R. M. Laing***; Mount Cook district, *F. G. Gibbs, T. F. C.* Westland—Haast Pass and Makaroro, *Poppelwell.* Otago—Mount Alta and Mount Aspiring, *Hector* and *Buchanan!* Hector Mountains, Dunstan Mountains, and all high mountains west of the Clutha River, *Petrie*; Eyre Mountains, *Poppelwell*; Garvie Mountains, *Crosby Smith.* Altitudinal range from 4000 to 7000 ft.

A very curious and interesting little plant, which was placed by Hooker in the *Portulacaceae*, although he admitted that it is not allied to any genus in the family. A few years ago its systematic position was investigated by Dr. J. Ewart, of Melbourne, who pointed out that it was undoubtedly related to the genus *Lyallia*, of Kerguelen Island. He therefore suggested that it should be removed from *Portulacaceae* and placed in the *Caryophyllaceae*, in the vicinity of *Lyallia* and *Pycnophyllum*. I am following his suggestion in this work.

Illecebraceae Hutch.

6. SCLERANTHUS Linn.

Small rigid usually densely tufted annual or perennial herbs. Leaves opposite, connate at the base, subulate, often serrulate; stipules wanting. Flowers small, green, axillary, solitary or 2 together, or in little cymes or fascicles. Perianth funnel-shaped or urceolate or turbinate, 4–5-toothed or -lobed. Stamens 1, 2, 5, or 10, inserted on the throat of the perianth; filaments subulate; anthers didymous. Ovary ovoid; styles 2, distinct; stigmas capitellate. Fruit a membranous utricle enclosed in the persistent and hardened perianth. Seed lenticular; testa smooth; embryo annular.

Species about 12, scattered through Europe, temperate and subtropical Asia, Africa, and Australasia. The single New Zealand species is also found in Australia.

The systematic position of *Scleranthus* has long been a matter for discussion. Bentham and Hooker placed it in the *Illecebraceae*, but long ago F. Mueller suggested its removal to the *Caryophyllaceae*, to which it is certainly very closely allied. This view has been accepted by Pax, who in the "Pflanzenfamilien" has transferred the whole family *Illecebraceae* to *Caryophyllaceae*.

(Forst.)

1. **S. biflorus** *Hook. f. Fl. Nov. Zel.* i (1853) 74.—A small densely branched glabrous or minutely pubescent perennial herb, usually forming compact cushions 1–4 in. diam. or more, rarely laxly branched with the stems creeping and elongating to 6 in. Leaves crowded and imbricating, rarely remote, $\frac{1}{10}$–$\frac{1}{12}$ in. long, narrow-linear, acute, concave, minutely serrulate, coriaceous. Peduncles axillary, solitary, very short in the flowering stage, but lengthening in fruit and overtopping the leaves. Flowers minute, in pairs or more rarely solitary at the top of the peduncle, sessile within

S. lyallii var. uniflorus Cheesem. N.Z.J.S.T. 8:372. 1926.

4 minute concave bracts placed crosswise. Perianth 4-lobed. Stamen 1, inserted on an annular membrane near the mouth of the perianth. Fruiting-perianth about $\frac{1}{12}$ in. long, hard, ovoid at the base; lobes erect. Utricle membranous, included.—*Handb. N.Z. Fl.* (1864) 234; *Benth. Fl. Austral.* v (1870) 259; *Cheesem. Man. N.Z. Fl.* (1906) 575. Mniarum biflorum *Forst. Char. Gen.* (1786) 2, t. 1; *Forst. f. Prodr.* (1786) n. 6; *A. Rich. Fl. Nouv. Zel.* (1832) 319; *A. Cunn. Precur.* (1839) n. 368; *Raoul Choix* (1846) 43. M. fasciculatum *Raoul l.c.* (*not of R. Br.*). Ditoca muscosa *Banks ex Gaertn. Fruct.* ii (1791) 196, t. 126.

North and South Islands, Stewart Island: Abundant throughout, from the Three Kings Islands and the North Cape to Foveaux Strait. Sea-level to 4000 ft.

Family XL. RANUNCULACEAE.

Annual or perennial herbs, rarely shrubs or woody climbers. Leaves all radical or alternate, seldom opposite (*Clematis*). Stipules wanting, or adnate to the petiole. Flowers regular or irregular, hermaphrodite or more rarely unisexual. Sepals 3 or more, usually 5, deciduous, often petaloid, imbricate (valvate in *Clematis*). Petals the same number as the sepals or more, hypogynous, free, imbricate, sometimes wanting. Stamens hypogynous, usually very numerous; anthers adnate. Carpels generally many, free, 1-celled; ovules one or several, attached to the ventral suture, anatropous. Fruit of numerous 1-seeded indehiscent achenes or many-seeded follicles, rarely a berry. Seeds small; embryo minute, at the base of copious albumen.

A large family, most abundant in temperate regions; rare within the tropics. Genera 30; species about 550. Most of the species are acrid, and many are poisonous, Aconite and Hellebore being familiar examples. All the New Zealand genera are widely distributed in temperate climates.

Woody climbers with opposite compound leaves. Sepals petaloid, valvate. Petals wanting	1. Clematis.
Minute herbs with radical linear leaves. Petals wanting. Carpels with a single pendulous ovule. Achenes in an elongated spike	2. Myosurus.
Herbs. Sepals deciduous. Petals 3 to many. Carpels with a single erect ovule	3. Ranunculus.
Herbs with radical sagittate leaves. Sepals petaloid. Petals wanting. Carpels with several ovules	4. Caltha.

1. CLEMATIS Linn. 1737

Climbing undershrubs with slender flexuous branches, rarely dwarf and prostrate. Leaves opposite, usually ternately divided into 3 stalked leaflets, which are either entire or more often variously lobed or cut; petioles often twining. Flowers in few- or many-flowered axillary panicles, dioecious in the New Zealand species. Sepals 4–8, petaloid, valvate in the bud. Petals wanting. Stamens many. Carpels numerous, each with one pendulous ovule. Fruit a head of sessile achenes, in all the New Zealand species produced into long feathery persistent styles.

A genus of over 150 species, found in most temperate climates, rare in the tropics. The New Zealand species are all endemic, and all possess once- or twice-ternately divided leaves and dioecious flowers, the males without any carpels, the females usually with a few imperfect stamens. Most of them vary greatly in the foliage, especially the large-leaved species. These in their normal state have 3-foliolate leaves with the

leaflets toothed or lobed, but all run into varieties in which the leaves are biternate or decompound, the ultimate segments being much reduced in size. These forms are most difficult of discrimination, especially when in a flowerless condition, and some of them are probably not permanent states.

A. Sepals white.

Large and stout. Leaflets usually entire. Flowers 2–4 in. diam. . . 1. *C. indivisa.*
Slender, pale-green. Leaflets toothed or lobed. Flowers 1–1½ in. diam. . . . . 2. *C. hexasepala.*
Small, slender. Leaflets pinnate or pinnately divided. Flowers ½–1 in. diam. . . . . 3. *C. australis.*

B. Sepals yellowish or greenish-yellow (purplish in C. quadribracteolata).

* Sepals usually 6 (5–8). Leaflets usually large and well developed.

Slender. Leaflets glabrous or nearly so, toothed or lobed. Flowers greenish-yellow. Sepals silky . . . . . 4. *C. Colensoi.*
Stout. Leaflets coriaceous, pubescent, toothed or lobed. Flowers yellow. Sepals densely tomentose . . . . . 5. *C. foetida.*
Slender. Leaflets thin, silky-pubescent, often entire. Flowers yellow. Sepals silky. Anthers broad, tipped with a minute appendage . . . . . 6. *C. parviflora.*

** Sepals 4. Leaflets minute, wanting in *C. afoliata.*

Usually leafless. Flowers greenish-white, ½–¾ in. diam. . . 7. *C. afoliata.*
Slender, brownish-green. Leaflets minute, ⅙–½ in. long, entire or toothed. Flowers yellow, ½ in. diam. . . . . 8. *C. marata.*
Very slender. Leaflets minute, usually linear. Flowers purplish, ⅓–½ in. diam. Sepals narrow-linear . . . . . 9. *C. quadribracteolata.*

paniculata J.F. Gmelin 1791. Linn. Syst. Nat.

1. **C. indivisa** *Willd. Sp. Plant.* ii (1799) 1291.—A large woody climber, often covering bushes or small trees. Stems stout, frequently as thick as a man's arm. Leaves of adult plants 3-foliolate, coriaceous, glabrous; leaflets 1–4 in. long, all stalked, ovate-oblong or ovate-cordate, rarely narrower and linear-oblong, lobed or more commonly entire. Leaves of seedling plants narrow-linear, 3–4 in. long, ¼–½ in. broad. These are followed by trifoliolate leaves with linear leaflets, which in their turn are succeeded by others in which the leaflets are broader, and much cut and lobed, the leaves occasionally being twice ternate. Flowers in axillary panicles, most abundantly produced, large, white, 2–4 in. diam., the males much the largest. Sepals 6–8, oblong. Anthers oblong, obtuse. Achenes numerous, downy, with a plumose tail often more than 2 in. long.—*A. Rich. Fl. Nouv. Zel.* (1832) 288; *A. Cunn. Precur.* (1838) n. 635; *Raoul Choix* (1846) 47; *Hook. f. Fl. Nov. Zel.* i (1853) 6; *Handb. N.Z. Fl.* (1864) 2; *T. Kirk Students' Fl.* (1899) 2; *Cheesem. Man. N.Z. Fl.* (1906) 2; *Ill. N.Z. Fl.* i (1914) t. 1. C. integrifolia *Forst. f. Prodr.* (1786) n. 231 (*but not of Linn. Sp. Plant.* (1753) 544).

North and South Islands, Stewart Island: Abundant throughout. Sea-level to 2500 ft. *Puawhananga.* August–November.

I have elsewhere proved (Trans. N.Z. Inst. xlvi (1914) 1) that Kirk's two varieties *lobulata* and *linearis* represent the foliage of young plants.

2. **C. hexasepala** *DC. Syst.* i (1818) 146.—Much smaller and more slender than *C. indivisa.* Leaves 3-foliolate, pale-green, coriaceous, glabrous; leaflets 1–3 in. long, stalked, narrow ovate-oblong or ovate-cordate, acute or acuminate, usually irregularly toothed or lobed, rarely entire. Flowers numerous, 1–1½ in. diam., white. Sepals 6–8, linear-oblong, obtuse, downy. Anthers long, linear, obtuse. Achenes numerous, narrow-ovoid, pilose.—

See Trans. 48: 335
76: 594

R. maculatus Ckn & All. 56 : 33
R. corsai Setaie 56 : 11

Murray Syst. Veg. 1784 : 512.
Linn R. Lapp. Fl. 1781 : 271.

A. Cunn. Precur. (1838) n. 637 ; *Raoul Choix* (1846) 47 ; *Hook. f. Handb. N.Z. Fl.* (1864) 2 ; *T. Kirk Students' Fl.* (1899) 3 ; *Cheesem. Man. N.Z. Fl.* (1906) 3. C. hexapetala *Forst. f. Prodr.* (1786) n. 230 ; *A. Rich. Fl. Nouv. Zel.* (1832) 288. C. Forsteri *Gmel. Syst.* (1791) 873. C. Colensoi *Hook. f. Fl. Nov. Zel.* i (1853) 6, t. 1 (*not of Handb. N.Z. Fl.*).

var. rutaefolia Hook. f. Fl. N.Z. 1 : 7.

North Island: From the Kaipara Harbour to Cook Strait, not uncommon, especially in the Upper Waikato and Taupo districts. South Island: Queen Charlotte Sound, *Forster ;* near Moutere (Nelson), *T. F. C.* Recorded from Canterbury (*J. B. Armstrong*), Otago (*Lindsay*), and the Bluff Hill (*T. Kirk*). *Pikiarero.* September–November.

Easily separated from *C. indivisa* by the smaller size, narrower pale-green leaves, which are almost always toothed, and by the smaller flowers. The leaves of the young plants pass through the same changes as those of *C. indivisa.*

3. **C. australis** *T. Kirk Students' Fl.* (1899) 3.—Stems and branches slender, much branched, glabrous or pubescent at the tips. Leaves 3-foliolate, glabrous, somewhat coriaceous (especially in the small-leaved forms) ; leaflets very variable in size, $\frac{1}{3}$–1 in. long, pinnate or pinnately lobed, segments or lobes usually again toothed or lobed. Flowers white, $\frac{1}{2}$–1 in. diam., in few-flowered panicles or solitary on long slender peduncles clustered in the axils of the leaves. Sepals 5–8, downy. Achenes narrowed into the style, usually pilose, sometimes glabrous when fully mature.—*Cheesem. Man. N.Z. Fl.* (1906) 3.

South Island: Hilly and mountain districts in Nelson and Canterbury, not uncommon. 500–3500 ft. November–January.

A puzzling plant, large states of which can only be separated from *C. hexasepala* by the pinnately divided leaflets, while smaller forms come very nearly to *C. Colensoi* var. *rutaefolia,* from which, however, it can usually be distinguished by the larger white flowers and more pointed sepals.

4. **C. Colensoi** *Hook. f. Handb. N.Z. Fl.* (1864) 2.—Stems and branches slender, glabrous or silky at the tips. Leaves 3-foliolate, mem- [illegible] leaflets stalked, 1–11 in. long, crenate-

Is Clematis colensoi, Hook.f. a true species?

T.N.Z.I. vol. 57, p. 50. Ckn. & Allan.

Clematis australis, T. Kirk.

"....the flowers are invariably yellow."

Ckn. & Allan in T.N.Z.I. vol. 57, p. 50.

5. **C. foetida** *Raoul Choix* (1846) 25, t. 22.—Stems stout, woody ; branches numerous, intertwined, often covering bushes or small trees ; young shoots clothed with fulvous pubescence. Leaves 3-foliolate, slightly coriaceous, usually thinly pubescent on both surfaces, but often becoming glabrous when old ; leaflets 1–2 in. long, all stalked, ovate or ovate-cordate,

leaflets toothed or lobed, but all run into varieties in which the leaves are biternate or decompound, the ultimate segments being much reduced in size. These forms are most difficult of discrimination, especially when in a flowerless condition, and some of them are probably not permanent states.

A. Sepals white.

Large and stout. Leaflets usually entire. Flowers 2–4 in. diam. .. 1. *C. indivisa.*
Slender, pale-green. Leaflets toothed or lobed. Flowers 1–1½ in. diam. .. .. 2. *C. hexasepala.*
Small, slender. Leaflets pinnate or pinnately divided. Flowers ½–1 in. diam. .. .. 3. *C. australis.*

B. Sepals yellowish or greenish-yellow (purplish in C. quadribracteolata).

* Sepals usually 6 (5–8). Leaflets usually large and well developed.

Slender. Leaflets glabrous or nearly so, toothed or lobed. Flowers greenish-yellow. Sepals silky .. .. .. 4. *C. Colensoi.*
Stout. Leaflets coriaceous, pubescent, toothed or lobed. Flowers yellow. Sepals densely tomentose .. .. 5. *C. foetida.*
Slender. Leaflets thin, silky-pubescent, often entire. Flowers yellow. Sepals silky. Anthers broad, tipped with a minute appendage .. .. 6. *C. parviflora.*

** Sepals 4. Leaflets minute, wanting in *C. afoliata.*

Usually leafless. Flowers greenish-white, ½–¾ in. diam. .. 7. *C. afoliata.*
Slender, brownish-green. Leaflets minute, ⅙–½ in. long, entire or toothed. Flowers yellow, ½ in. diam. .. .. .. 8. *C. marata.*
Very slender. Leaflets minute, usually linear. Flowers purplish, ⅓–½ in. diam. Sepals narrow-linear .. .. .. 9. *C. quadribracteolata.*

paniculata J.F. Gmelin. 1791. Linn. Syst. Nat.

1. **C. indivisa** *Willd. Sp. Plant.* ii (1799) 1291.—A large woody climber, often covering bushes or small trees. Stems stout, frequently as thick as a man's arm. Leaves of adult plants 3-foliolate, coriaceous, glabrous; leaflets 1–4 in. long, all stalked, ovate-oblong or ovate-cordate, rarely narrower and linear-oblong, lobed or more commonly entire. Leaves of seedling plants narrow-linear, 3–4 in. long, ¼–½ in. broad. These are followed by trifoliolate leaves with linear leaflets, which in their turn are succeeded by others in which the leaflets are broader, and much cut and lobed, the leaves occasionally being twice ternate. Flowers in axillary panicles, most abundantly produced, large, white, 2–4 in. diam., the males much the l
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See Trans. 48: 335
76: 594

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North Island: From the Kaipara Harbour to Cook Strait, not uncommon, especially in the Upper Waikato and Taupo districts. South Island: Queen Charlotte Sound, *Forster ;* near Moutere (Nelson), *T. F. C.* Recorded from Canterbury (*J. B. Armstrong*), Otago (*Lindsay*), and the Bluff Hill (*T. Kirk*). *Pikiarero.* September–November.

Easily separated from *C. indivisa* by the smaller size, narrower pale-green leaves, which are almost always toothed, and by the smaller flowers. The leaves of the young plants pass through the same changes as those of *C. indivisa.*

3. **C. australis** *T. Kirk Students' Fl.* (1899) 3.—Stems and branches slender, much branched, glabrous or pubescent at the tips. Leaves 3-foliolate, glabrous, somewhat coriaceous (especially in the small-leaved forms) ; leaflets very variable in size, $\frac{1}{3}$–1 in. long, pinnate or pinnately lobed, segments or lobes usually again toothed or lobed. Flowers white, $\frac{1}{2}$–1 in. diam., in few-flowered panicles or solitary on long slender peduncles clustered in the axils of the leaves. Sepals 5–8, downy. Achenes narrowed into the style, usually pilose, sometimes glabrous when fully mature.—*Cheesem. Man. N.Z. Fl.* (1906) 3.

South Island: Hilly and mountain districts in Nelson and Canterbury, not uncommon. 500–3500 ft. November–January.

A puzzling plant, large states of which can only be separated from *C. hexasepala* by the pinnately divided leaflets, while smaller forms come very nearly to *C. Colensoi* var. *rutaefolia*, from which, however, it can usually be distinguished by the larger white flowers and more pointed sepals.

4. **C. Colensoi** *Hook. f. Handb. N.Z. Fl.* (1864) 2.—Stems and branches slender, glabrous or silky at the tips. Leaves 3-foliolate, membranous or slightly coriaceous ; leaflets stalked, $\frac{1}{3}$–$1\frac{1}{4}$ in. long, crenate, unequally toothed or 3-lobed, or again ternately or pinnately divided. Flowers greenish-yellow, $\frac{1}{2}$–1 in. diam., in few- or many-flowered panicles, or more usually solitary on slender peduncles fascicled in the axils of the leaves. Sepals 5–8, oblong, silky. Anthers linear. Achenes silky or sometimes nearly glabrous when mature.—*T. Kirk Students' Fl.* (1899) 3 ; *Cheesem. Man. N.Z. Fl.* (1906) 3. C. hexasepala *Hook. f. Fl. Nov. Zel.* i (1853) 7 (*not of DC.*).

Var. **rutaefolia** *Hook. f. Fl. Nov. Zel.* i (1853) 7.—Leaves biternate or bipinnate ; secondary leaflets often stalked. Usually smaller than the type.

North Island: Both varieties common about Wellington, and extending northward to Hawke's Bay and Cape Egmont. South Island: Nelson—Wairau Valley, Buller Valley, *T. F. C.* Canterbury—Kowai River, *Petrie !* Ashley Gorge, *Cockayne !* Sea-level to 3000 ft. November–January.

A variable plant, not always readily distinguishable from states of *C. hexasepala* or *C. australis.*

5. **C. foetida** *Raoul Choix* (1846) 23, t. 22.—Stems stout, woody ; branches numerous, intertwined, often covering bushes or small trees ; young shoots clothed with fulvous pubescence. Leaves 3-foliolate, slightly coriaceous, usually thinly pubescent on both surfaces, but often becoming glabrous when old ; leaflets 1–2 in. long, all stalked, ovate or ovate-cordate,

acute or acuminate, entire or irregularly toothed or lobed. Panicles large, much divided; branches usually densely clothed with pale or fulvous tomentum. Flowers very numerous, small, ½–¾ in. diam., yellowish, strongly odorous but certainly not foetid. Sepals 6–8, linear, obtuse or acute, densely tomentose on the outside. Anthers linear-oblong, obtuse. Achenes narrow-ovoid, very silky, narrowed into short plumose tails.—*Hook. f. Fl. Nov. Zel.* i (1853) 7; *Handb. N.Z. Fl.* (1864) 2; *T. Kirk Students' Fl.* (1899) 4; *Cheesem. Man. N.Z. Fl.* (1906) 4. C. Parkinsonia *Col. in Trans. N.Z. Inst.* xii (1880) 359, xiv (1882) 331.

North and South Islands: Not uncommon in lowland districts from the North Cape to the south of Otago. September–November.

Varies considerably in size, texture, cutting of the leaves, degree of pubescence, &c.; but can always be recognized by the pale or fulvous pubescence on the leaves, young shoots, and branches of the panicle, by the small yellow flowers, which are usually produced in enormous numbers, and by the dense tomentum on the sepals. The type specimens of Mr. Colenso's *C. Parkinsoniana*, preserved in his herbarium, show no points of difference from the ordinary form of *C. foetida*.

6. **C. parviflora** *A. Cunn. Precur.* (1838) n. 636.—More or less clothed with silky fulvous pubescence. Stems slender, wiry, not nearly so robust or so much branched as in the preceding species. Leaves 3-foliolate, thin and almost membranous, more rarely subcoriaceous, tawny-pubescent, especially on the veins and under-surface; leaflets ½–1½ in. long, all stalked, ovate or ovate-cordate, usually entire but occasionally irregularly lobed, subacute. Panicles slender, branched; rhachis and pedicels tawny-pubescent. Flowers small, ½–¾ in. diam., yellowish. Sepals 6–8, linear, more or less clothed with silky pubescence. Anthers short and broad, oblong, with a minute appendage at the apex of the connective. Achenes narrow-ovoid, silky.—*Raoul Choix* (1846) 47; *Hook. f. Fl. Nov. Zel.* i (1853) 7; *Handb. N.Z. Fl.* (1864) 2; *T. Kirk Students' Fl.* (1899) 4; *Cheesem. Man. N.Z. Fl.* (1906) 4; *Ill. N.Z. Fl.* i (1914) t. 4. C. Hillii *Col. in Trans. N.Z. Inst.* xxxi (1899) 266.

Var. **depauperata** *Hook. f. Handb. N.Z. Fl.* (1864) 2.—Leaflets very small. Sepals narrowed into long slender points.

Var. **trilobata** *T. Kirk Students' Fl.* (1899) 5.—Leaflets deeply 3-lobed; lobes entire or cut. Flowers smaller. Sepals more pubescent.

North Island: The typical form in various localities from the Three Kings Islands and the North Cape to Hawke's Bay, but often local. Var. *trilobata:* Bay of Islands, *T. Kirk!* Northern Wairoa, *T. F. C.;* Te Aroha, *T. F. C.;* between Gisborne and Napier, *Bishop Williams!* South Island: Var. *depauperata:* Nelson, *W. T. L. Travers.* Var. *trilobata:* Okarito, *A. Hamilton.* Sea-level to 1500 ft. September–November.

A handsome species, closely allied to *C. foetida*, but at once distinguished by the smaller size, more slender habit, smaller and thinner usually entire leaflets, narrower silky sepals, and especially by the broad anthers, which have a minute swelling at the tip of the connective. I have not seen specimens of Hooker's var. *depauperata.*

7. **C. afoliata** *Buch. in Trans. N.Z. Inst.* iii (1871) 211.—Stems and branches leafless, wiry, striate, glabrous, often much intertwined. Leaves usually reduced to petioles in the mature plant, when present consisting of 3 minute long-stalked ovate or triangular leaflets; in young plants more frequently developed and rather larger. Flowers greenish-white, ½–¾ in. diam., in fascicles of 2–5 in the axils of the petioles; peduncles slender, pilose, each with a pair of minute ovate bracteoles. Sepals 4,

R. maculatus Cheesem. & Allan. 56 : 33
R. cessi Petrie 56 : 11

ovate- or oblong-lanceolate, usually acute, silky. Anthers linear. Achenes ovoid, silky.—*T. Kirk Students' Fl.* (1899) 3; *Cheesem. Man. N.Z. Fl.* (1906) 5. C. aphylla *Col. in Trans. N.Z. Inst.* xix (1887) 259.

North Island: Hawke' Bay—Puketapu, *H. Hill!* South Island: Marlborough—Near Picton, *J. Rutland! Buchanan!* Awatere Valley, *Cockayne.* Nelson—Hanmer Plains, *H. J. Matthews!* Waiau Valley, *T. Kirk!* Canterbury—*N. T. Carrington!* Weka Pass, *Cockayne;* Waitaki Valley, *Buchanan, Petrie!* Otago—Duntroon, *Petrie!* Southland—Kingston, *Crosby Smith.*

A very curious plant, often forming dense masses of intertwined stems and branches several feet in length.

8. **C. marata** *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 335.—Stems slender, much branched, often forming dense interlaced masses scrambling over bushes or among grass, brownish-green, pubescent, grooved. Leaves 3-foliolate, usually pubescent on both surfaces; petioles variable in length, 1–4 in.; leaflets small, $\frac{1}{6}$–$\frac{1}{2}$ in. long, all stalked, exceedingly variable in shape, narrow-linear to ovate, acute or obtuse, entire notched or lobed, or even again 3-partite. Peduncles 1-flowered, solitary or 2–4 together in the axils of the leaves, pubescent. Bracteoles in 2 pairs, connate at the base, upper pair much the larger, often foliaceous. Flowers yellowish, small, $\frac{1}{2}$–$\frac{3}{4}$ in. diam., sweet-scented. Sepals 4, linear-oblong, acute or obtuse, silky. Anthers linear. Achenes narrow, margined, silky or nearly glabrous when old, narrowed into rather long plumose tails.—*T. Kirk Students' Fl.* (1899) 4; *Cheesem. Man. N.Z. Fl.* (1906) 5.

North Island: Upper Thames Valley, from Te Aroha southwards, *T. F. C., Petrie!* Taupo, *T. F. C.;* East Cape, *T. Kirk;* probably not uncommon in the interior. South Island: Apparently common throughout, *J. B. Armstrong! Buchanan! T. Kirk!* &c. Sea-level to 3000 ft. September–November.

The brownish colour, slender habit, minute leaflets, and small flowers distinguish this from all other except *C. quadribracteolata*, to which some forms approach far too closely. A variety collected by Mr. Petrie at Tuapeka (Otago) appears to be quite intermediate, and might almost be referred to either species. North Island specimens are usually more slender and have smaller leaflets than the southern ones. Some of Mr. Petrie's Otago specimens are remarkable for their large foliaceous bracteoles, which are linear-spathulate and sometimes $\frac{3}{4}$ in. long.

9. **C. quadribracteolata** *Col. in Trans. N.Z. Inst.* xiv (1882) 329.—Stems and branches very slender, branched, trailing, 1–3 ft. long, glabrous except the very young shoots. Leaves few, trifoliolate; petioles slender, 1–2 in. long; leaflets minute, $\frac{1}{6}$–$\frac{1}{4}$ in. long, usually linear or lanceolate, but varying to linear-oblong, ovate-lanceolate, or triangular-acute, glabrous, entire or one or all 3-lobed. Peduncles solitary or 2–3 together in the axils of the leaves, 1-flowered, usually shorter than the petioles, pubescent; bracteoles 2 or 3 pairs, connate, upper the largest, sheathing at the base, rounded, obtuse. Flowers purplish, sweet-scented, $\frac{1}{4}$–$\frac{3}{4}$ in. diam. Sepals 4, linear or linear-oblong, usually acute, silky. Anthers linear. Achenes small, almost glabrous when fully ripe, narrowed into short plumose tails.—*T. Kirk Students' Fl.* (1899) 5; *Cheesem. Man. N.Z. Fl.* (1906) 6. C. foetida *var.* depauperata *Hook. f. Fl. Nov. Zel.* i (1853) 7; *Handb. N.Z. Fl.* (1864) 2.

North Island: Low grounds in the Hawke's Bay District; Lake Rotoatara, *Colenso!* Petane, *A. Hamilton!* between the Ngaruroro and Tukituki Rivers, *Sturm.*

This can only be separated from the preceding by its smaller size, more slender habit, narrower leaflets, purplish flowers, and narrower sepals. Further investigation will probably prove both to be forms of one variable plant.

2. **MYOSURUS** Linn.

Annual herbs, of small size. Leaves all radical, linear, entire. Scapes usually numerous, naked, 1-flowered. Sepals 5, rarely more, minutely spurred at the base. Petals wanting in the New Zealand species. Stamens 5–8. Carpels numerous; ovules solitary, pendulous. Achenes closely packed on a long and slender spike-like receptacle which usually lengthens much as they ripen, each with a raised nerve on the back, ending in a short persistent style.

A small genus of only two species, one of which is widely spread in the North Temperate Zone, and is also found in Australia; the other is known only from California, Chile, and New Zealand.

1. **M. aristatus** *Benth. in Lond. Journ. Bot.* vi (1847) 459.—Varying in size from 1–3 in. Leaves numerous, $\frac{1}{20}$ in. broad or even less, erect, linear or linear-spathulate. Scapes usually several, slender, 1-flowered. Flower minute, yellowish, apetalous. Sepals 5, spur short. Stamens generally 5. Receptacle in fruit oblong or linear, $\frac{1}{4}$–$\frac{3}{4}$ in. long; achenes with a short beak.—*Hook. f. Fl. Nov. Zel.* i (1853) 8; *Handb. N.Z. Fl.* (1864) 3; *T. Kirk Students' Fl.* (1899) 5; *Cheesem. Man. N.Z. Fl.* (1906) 6.

North Island: Palliser Bay, *Colenso!* Ocean Beach near Wellington, *Buchanan.* South Island: Moist gravelly places near Lake Tekapo, *T. F. C.* Otago—Hyde, Beaumont, Speargrass Flat, Ida Valley, Lake Wanaka, *Petrie!* Gimmerburn, *T. Kirk!* Altitudinal range from sea-level to 2500 ft.

Of late years much attention has been given to the genus *Myosurus*, especially by American botanists, and several new species have been described. The Californian plant formerly included in *M. aristatus* by Bentham has long ago been separated, and grave doubts have been expressed as to the identity of the New Zealand plant with the Chilian *M. aristatus*. I suspect that the two are specifically distinct, but defer publication of a new name until more definite information has been received.

3. **RANUNCULUS** Linn. 1765. See Benson Am. J. Bot. 29: 491. 1942.

Herbs with petioled entire lobed or dissected leaves and yellow or white flowers. Sepals 3–5, deciduous. Petals usually about 5, but varying in number from 4 to 20, with 1–3 glandular pits or scales near the base. Stamens many. Carpels usually numerous; styles short; ovules solitary, ascending. Achenes numerous, 1-seeded, collected into a globular or ovoid head tipped with the persistent straight or recurved style.

A large genus of probably quite 300 species, dispersed over the whole world, but most numerous in temperate or cool regions. In New Zealand it forms a very conspicuous portion of the mountain vegetation, especially in the South Island; some of the species, as *R. Lyallii* and *R. insignis*, being the finest known. Many of them are variable and difficult of discrimination, especially in the section with compressed achenes. Of the 40 species admitted in this work, 4 are found in Australia, 1 in Chile, while another ranges from Fuegia and Falkland Islands to South Georgia, Kerguelen Island and its satellites to Macquarie Island, the remaining 34 being endemic. In addition to the native species, at least 10 or 11 from the Northern Hemisphere have become naturalized as weeds in pastures and waste places, the most abundant being *R. bulbosus* L., *R. sardous* Crantz, and *R. repens* L. References to descriptions of these will be found in the Appendix.

A. Stems tall, erect. Flowers large. Achenes villous or silky.

* Flowers white.

Leaves large, peltate, margins simply crenate	.. ..	1. *R. Lyallii.*
Leaves reniform in outline, coarsely ternatisect, 3–6 in. diam.	..	2. *R. Matthewsii.*
Leaves 3–5-partite or dissected; segments usually linear	..	3. *R. Buchanani.*

R. maculatus Ckn & All. 56:33
R. carsei Petrie 56:11
R. parvulus Simps. 75:187.

** Flowers yellow.

Villous. Leaves coriaceous, rounded-cordate or reniform, crenate-lobed	4. *R. insignis.*
Almost glabrous. Leaves submembranous, reniform or subpeltate	5. *R. lobulatus.*
Glabrous. Leaves broadly oblong, crenate. Achenes only slightly hairy	6. *R. Godleyanus.*

B. Stems erect, without creeping stolons. Achenes glabrous, turgid or angled, not compressed nor margined, never muricate or tuberculate.

* Stems usually stout, 4–16 in. high. Leaves broad, reniform to ovate, coarsely crenate or dentate or lobed.

Leaves reniform to ovate. Scapes 1–many-flowered. Petals twice as long as the sepals	7. *R. Monroi.*
Leaves rounded-reniform. Scape thickened above, seldom more than 1-flowered. Petals not much longer than the sepals	8. *R. pinguis.*
Leaves reniform in outline, 3-lobed to the middle. Scape 3–5 in. high, 1–3-flowered. Achene turgid, 2-winged at the base	9. *R. Grahami.*

** Stems tall, slender. Leaves deeply cut and lobed. Petals narrow, 8–15.

Pilose, stems 1–3 ft., many-flowered. Flowers 1–1½ in. diam.	10. *R. nivicola.*
Glabrous or slightly pilose, stems 6–10 in., few-flowered. Flowers ½–1 in. diam.	11. *R. geraniifolius.*

*** Stems short, simple. Leaves usually all radical. Scapes 1-flowered (1–3-flowered in *R. Haastii*, and sometimes 2-flowered in *R. Enysii*).

Glabrous, 6–15 in. high. Leaves 3–5-foliolate. Scapes 1–5. Achenes ovoid; styles short, straight or curved	12. *R. Enysii.*
Pilose or nearly glabrous, 6–15 in. high. Leaves 3–5-partite. Achenes fusiform, narrowed into a long spirally recurved style	13. *R. tenuicaulis.*
Short, stout, glabrous, almost stemless. Leaves all radical, fleshy or coriaceous, palmatipartite or 3-foliolate or 3–5-lobed.	
Leaves few, coriaceous, palmatipartite; segments laciniate. Scape 1–3-flowered, with crowded laciniate bracts under the flowers	14. *R. Haastii.*
Leaves biternately multifid, glaucous and fleshy; segments $\frac{1}{10}$ in. long. Scape shorter than the leaves	15. *R. crithmifolius.*
Leaves many, 3-partite, segments lobed. Scapes shorter than the leaves	16. *R. chordorhizos.*
Leaves 3–8, transversely oblong, 3-lobed to the middle. [illegible] than the leaves	17. *R. naucifolius.*

new species.

Ranunculus simpsonii, Ckn. & Allan.

South Is. Bold Peak nr. Lake Wakatipu
G. Simpson and J.S. Thomson.

(see T.N.Z.I. vol. 57, p. 58. Ckn. & Allan)

C. Stems not creeping. [illegible] *muricate. (Achenes sometimes obscurely compressed, but always thinner than in the previous section. The margins are apparently not thickened in* R. aucklandicus.*)*

Tall, slender, often nearly 3 ft. high. Petioles often more than 12 in. long. Laminae 1–3 in. long, trifoliolate. Style strongly curved	24. *R. Urvilleanus.*
Smaller and stouter than above, 5–15 in., hirsute. Flowers smaller	25. *R. hirtus.*

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South Isl
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Kirk!

Beach near Wellington, *Buchanan.*

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Glabrous. Leaves broadly oblong, crenate. Achenes only slightly hairy	6. *R. Godleyanus.*

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Leaves rounded-reniform. Scape thickened above, seldom more than 1-flowered. Petals not much longer than the sepals	8. *R. pinguis.*
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Pilose, stems 1–3 ft., many-flowered. Flowers 1–1½ in. diam.	10. *R. nivicola.*
Glabrous or slightly pilose, stems 6–10 in., few-flowered. Flowers ½–1 in. diam.	11. *R. geraniifolius.*

*** Stems short, simple. Leaves usually all radical. Scapes 1-flowered (1–3-flowered in *R. Haastii*, and sometimes 2-flowered in *R. Enysii*).

Glabrous, 6–15 in. high. Leaves 3–5-foliolate. Scapes 1–5. Achenes ovoid; styles short, straight or curved	12. *R. Enysii.*
Pilose or nearly glabrous, 6–15 in. high. Leaves 3–5-partite. Achenes fusiform, narrowed into a long spirally recurved style	13. *R. tenuicaulis.*
Short, stout, glabrous, almost stemless. Leaves all radical, fleshy or coriaceous, palmatipartite or 3-foliolate or 3–5-lobed.	
Leaves few, coriaceous, palmatipartite; segments laciniate. Scape 1–3-flowered, with crowded laciniate bracts under the flowers	14. *R. Haastii.*
Leaves biternately multifid, glaucous and fleshy; segments $\frac{1}{10}$ in. long. Scape shorter than the leaves	15. *R. crithmifolius.*
Leaves many, 3-partite, segments lobed. Scapes shorter than the leaves	16. *R. chordorhizos.*
Leaves 3–8, transversely oblong, 3-lobed to the middle. Scape longer than the leaves	17. *R. paucifolius.*
Small, orbicular-reniform, 3-lobed to the middle; lobes crenate. Scape longer than the leaves	18. *R. Berggreni.*
Small, leaves trifoliolate, leaflets lobed or partite. Scape longer than the leaves	19. *R. novae-zealandiae*
Stout or slender; silky, pilose, or glabrate. Leaves all radical; pinnate, pinnatisect or pinnately multifid.	
Stout. Leaves tripinnatisect, usually copiously silky. Scape stout. Flower large	20. *R. sericophyllus.*
Characters of *R. sericophyllus*, but scape usually 2–3-flowered	21. *R. Baughani.*
Slender, almost glabrous. Leaves bipinnatisect or mutifid; segments very narrow. Scape slender. Flowers small	22. *R. Sinclairii.*
Slender, pilose. Leaves pinnate; pinnae 3-lobed or -partite; segments oblong or cuneate. Scape slender. Flowers small	23. *R. gracilipes.*

C. Stems not creeping. Achenes glabrous, compressed, with a thickened margin, not muricate. (Achenes sometimes obscurely compressed, but always thinner than in the previous section. The margins are apparently not thickened in R. aucklandicus.*)*

Tall, slender, often nearly 3 ft. high. Petioles often more than 12 in. long. Laminae 1–3 in. long, trifoliolate. Style strongly curved	24. *R. Urvilleanus.*
Smaller and stouter than above, 5–15 in., hirsute. Flowers smaller	25. *R. hirtus.*

Small, stemless, 1½ in. high at most. Leaves rosulate, 3-lobed or -partite, exceeding the flower .. .. 26. *R. recens.*
Small, slender, 3–6 in. high. Leaves trifoliolate; leaflets all stalked, obtuse. Achenes few, 3–5 .. .. .. 27. *R. Kirkii.*
Stems short, simple. Leaves all radical, usually toothed or 3–5-lobed, rarely partite. Scapes 1–5, longer than the leaves. Sepals spreading .. .. 28. *R. lappaceus.*
Stems branched, hirsute, leafy. Leaves coarsely toothed or 3-lobed. Scapes radical and axillary, not exceeding the leaves 29. *R. foliosus.*
Erect or suberect, clothed with short stiff appressed hairs. Leaves deltoid-cordate, 3-partite. Scapes 1–3-flowered, longer or shorter than the leaves. Sepals spreading .. .. 30. *R. subscaposus.*
Erect, strigose-hirsute. Leaves rounded-reniform, 3-partite. Scapes 1–3, 1-flowered. Achenes compressed; margins not thickened .. .. 31. *R. aucklandicus.*

D. Stems creeping, or with prostrate stolons. Achenes glabrous, not muricate.

Stems robust, branched, prostrate and rooting at the nodes. Leaves 3-toothed or -lobed. Scapes short, axillary .. 32. *R. Cheesemanii.*
Stems weak, matted, often rooted at the nodes. Leaves tufted, trifoliolate; leaflets often again divided, small. Flowers minute .. .. 33. *R. ternatifolius.*
Small, depressed, stoloniferous, 1½ in. high. Leaves ternatisect or multisect, segments narrow-linear. Scapes naked, 1-flowered. Flower small .. .. 34. *R. depressus.*
Small, much depressed, 1½ in. high. Rootstock creeping, much branched. Leaves cuneate. Scape 1-flowered. Flower small 35. *R. pachyrhizus.*
Stem fistulose, creeping and rooting at the nodes. Leaves on petioles 6–18 in. long; blade 3–5-partite, 1–2½ in. diam.; segments broad .. .. 36. *R. macropus.*
Stems creeping and rooting at the nodes or floating. Leaves on petioles 1–6 in. long; blade 3–5-partite, 1–1½ in. diam; segments usually narrow .. .. 37. *R. rivularis.*
Stems creeping and matted. Leaves small, 3-foliolate. Scapes shorter than the leaves, 1-flowered .. .. .. 38. *R. acaulis.*
Stems creeping and rooting at the nodes. Leaves fleshy, reniform, 3-lobed or -partite .. .. 39. *R. biternatus.*
Stems filiform, creeping and matted. Leaves linear-spathulate, entire. Flowers minute, tetramerous .. .. .. 40. *R. Limosella.*

E. Achenes muricate or tuberculate.

Small, annual. Stems slender, branched. Flowers minute, almost sessile, opposite the leaves .. .. .. 41. *R. sessiliflorus.*

1. **R. Lyallii** *Hook. f. Handb. N.Z. Fl.* (1864) 4.—A tall, erect, exceedingly handsome plant, with a paniculately branched flowering stem 1–4 ft. in height. Rootstock stout, with long fleshy roots. Radical leaves on long stout petioles with broad silky sheathing bases; limb 6–15 in. diam., orbicular, peltate, concave, crenate, coriaceous, glabrous or with a few weak hairs. Cauline leaves few, sessile, lower reniform, upper cuneate-rhomboid or oblong-cuneate, lobed and crenate. Leaves of young plants not peltate, reniform to rhomboid, cuneate at the base. Peduncles stout, villous, with 1–2 linear bracts. Flowers numerous, 2–3 in. diam., white, more rarely cream-coloured. Sepals 5, broad, villous. Petals usually numerous, cuneate-obovate, with an obscure gland at the base. Stamens many, short; anthers oblong. Receptacle oblong, cylindrical, hairy. Ripe achenes forming a head ¾ in. diam., oblique, turgid, villous, narrowed into long slender flexuous styles.—*Bot. Mag.* (1886) t. 6888; *T. Kirk Students' Fl.* (1899) 7; *Cheesem. Man. N.Z. Fl.* (1906) 9; *Ill. N.Z. Fl.* i (1914) t. 3.

Var. **Traversii**. (ithf.)—Smaller. Leaves 5–7 in. diam., doubly crenate, and with two incisions near the base. Flowers cream-coloured.—R. Traversii *Hook. f. Handb. N.Z. Fl.* (1864) 4; *T. Kirk Students' Fl.* (1899) 7.

var. arenea. Handb. p. 422.

SOUTH ISLAND: Abundant in the central and western portions of the Southern Alps, from the Spenser Mountains to the south of Otago. STEWART ISLAND: Mount Anglem, *T. Kirk.* Altitudinal range from 2000 to 5000 ft. November–January. Var. *Traversii:* Hurunui Mountains, Canterbury, *W. T. L. Travers.*

A magnificent plant, by far the finest of the genus; so common in many portions of the Southern Alps that in summer the mountain-slopes are whitened from the abundance of the flowers. It has received many local names, as the "mountain lily," "shepherd's lily," "Mount Cook lily," &c. Its nearest ally outside New Zealand is *R. Baurii* MacOwan, from the Transvaal, which has peltate leaves 4–5 in. diam. and small yellow flowers. *R. Traversii* does not seem to have been observed since its first discovery more than forty years ago. I have seen no specimens, but I am indebted to the Director of the Kew Herbarium for a drawing of the type specimen, which leaves no doubt in my mind that it is merely a local form of *R. Lyallii*, or possibly an abnormal single specimen. I am indebted to Dr. Cockayne for a somewhat similar abnormality, in which the leaves are bicrenate, with one or two irregular notches.

R. buch. × lyallii

× 2. **R. Matthewsii** *Cheesem. Man. N.Z. Fl.* (1906) 1133. — Habit of *R. Buchanani*, but larger and stouter, 15–20 in. high, glabrous or with a few weak hairs on the petioles and peduncles. Radical leaves on stout petioles 3–9 in. long, reniform or orbicular in outline, ternatisect; the main divisions petiolate, coarsely toothed or lobed. Cauline leaves sessile, deeply toothed or lobed, but not so finely as in *R. Buchanani*. Flowers 1–4, large, pure-white, sweet-scented, 2½–3 in. diam. Sepals 5, slightly villous, reflexed when the flower is mature. Petals numerous, 12–20, oblong-cuneate, rounded at the tip, narrowed to the base; gland solitary, large, basilar. Achenes turgid, pilose, forming an oblong-globose head ½ in. diam. or more; styles long, subulate.

SOUTH ISLAND: Otago—Mount Earnslaw, alt. 4000–6000 ft., *H. J. Matthews!*

I have few good specimens of this beautiful plant, and some allowance must consequently be made for the description. It is evidently very close to *R. Buchanani*, differing chiefly in the larger size and stouter habit, in being almost glabrous, and in the more sparingly divided leaves and larger flowers.

3. **R. Buchanani** *Hook. f. Handb. N.Z. Fl.* (1864) 5.—Stout, erect, more or less covered with long silky hairs, rarely almost glabrous. Rootstock thick, with numerous long fleshy rootlets. Radical leaves on long petioles 2–6 in. long, with short and broad sheathing bases; blade reniform in outline, 2–6 in. diam., ternatisect, main divisions stalked, more or less deeply divided into linear or cuneate lobes, which are usually again 3–5-fid or -toothed, rarely entire. Cauline leaves similar, but usually more finely cut, sessile or nearly so. Flowers solitary or 2–3, large, white, 1½–2½ in. diam. Sepals 5, oblong, villous. Petals very numerous, linear-oblong, rounded at the apex, narrowed to the base; gland solitary, basilar. Achenes turgid, pilose, forming a globose head ½ in. diam.—*T. Kirk Students' Fl.* (1899) 8; *Cheesem. Man. N.Z. Fl.* (1906) 10. T. 65 : 223 & 71 : 65

SOUTH ISLAND: Otago—Lake district, *Buchanan!* Mounts Bonpland, Tyndall, and Aspiring, *Petrie!* Mount Earnslaw, *H. J. Matthews!* Bald Peak, *B. C. Aston!* Mackinnon's Pass and Mount Balloon, *H. J. Matthews* and *F. G. Gibbs!* Eyre Mountains and Routeburn, *Poppelwell;* Lake Hauroko, *Crosby Smith.* Altitudinal range 4000–6000 ft. December–January.

A singular and beautiful plant, quite unlike any other, confined, so far as is known, to the high mountains to the west of the Otago lake district. The leaves are said to be sometimes nearly entire, and the flowers yellow, but I have not seen specimens showing these peculiarities.

var. laciniata allan. 65 : 223

var. multifida allan. 65 : 223.

4. **R. insignis** *Hook. f. Fl. Nov. Zel.* i (1853) 8, t. 2.—A stout, erect, paniculately branched plant 1–3 ft. in height, usually villous in all its parts, brownish or rufous when dry. Radical leaves numerous, large, on stout petioles with broad sheathing bases, thick and coriaceous, rounded-cordate or reniform, crenate and often shortly lobed, 4–9 in. diam.; cauline smaller, upper ones cut and lobed. Peduncles often very numerous, stout; bracts linear-oblong. Flowers golden-yellow, 1–2 in. diam. Sepals 5, woolly at the back. Petals 5–6, rarely more, obcordate, with 1 or 2 glands at the base. Stamens many, short. Receptacle oblong, pubescent. Achenes forming a rounded head ½ in. diam., tumid, villous; style long, slender.—*Handb. N.Z. Fl.* (1864) 4; *T. Kirk Students' Fl.* (1899) 7; *Cheesem. Man. N.Z. Fl.* (1906) 10. R. Ruahinicus *Col. in Trans. N.Z. Inst.* xviii (1886) 256. R. sychnopetala *Col. l.c.* xxv (1893) 324, *and* xxvi (1894) 313 (a monstrous state with very numerous narrow petals). R. rufus *Col. l.c.* xxviii (1896) 591.

North Island: High mountains of the interior, from the East Cape, Tongariro, and Ruapehu southwards to the Kaimanawa, Ruahine, and Tararua Mountains. South Island: Nelson—Mountains, not uncommon from Collingwood and the Mount Arthur Range southwards to Lake Rotoiti and the Upper Wairau Valley to Lake Tennyson; Kaikoura Mountains, &c. Altitudinal range 2500–5000 ft. January–February.

A beautiful plant, varying much in size, stoutness, degree of hairiness, &c. I have seen no South Island specimens equalling in size and number of flowers those collected by Colenso more than fifty years ago on the Ruahine Mountains and now preserved in his herbarium.

(T. Kirk)

5. **R. lobulatus** *Cockayne in Trans. N.Z. Inst.* xxxviii (1906) 373 (*name only*).—Rather slender, paniculately branched above, 12–18 in. high. Radical leaves numerous, large, 6–14 in. long or more; blade 6–8 in. diam., usually orbicular-reniform with an open sinus; but sometimes the sinus is closed, so that the leaf becomes more or less subpeltate; shallowly lobed, with the lobes again lobed or crenate, rather thin and membranous; upper surface glabrous or nearly so, bright-green; the under-surface paler, and together with the margins and petiole more or less clothed with long and slender white hairs. Scape 15–18 in. high, 5–15-flowered, glabrous, or with a few long hairs at the axils of the branches. Flowers 1–1¼ in. diam., bright-yellow. Sepals reflexed, oblong, pilose with long hairs. Petals 5–6, obovate, rounded or emarginate at the apex. Ripe achenes not seen.—R. insignis *var.* lobulatus *T. Kirk Students' Fl.* (1899) 8; *Cheesem Man. N.Z. Fl.* (1906) 10. Tr. & Proc. 72: 21. (1942).

South Island: Marlborough—Mount Fyffe, *T. Kirk! H. J. Matthews! Cockayne!* Kowhai River, *T. Kirk;* Woodside Creek, *Cockayne.* Altitudinal range from sea-level to 3000 ft. October–November.

A very handsome and remarkable species. I have seen few wild specimens, but the late Mr. H. J. Matthews supplied me with an excellent suite obtained from cultivated plants in his garden at Dunedin.

6. **R. Godleyanus** *Hook. f. Handb. N.Z. Fl.* (1864) 723.—Stout, erect, glabrous, 1–2 ft. high. Leaves all radical, on thick fleshy petioles 2–6 in. long by ½–¾ in. diam.; blade 3–6 in. long, broadly oblong, rounded at the apex, cordate, rounded or cuneate at the base, coarsely crenate, fleshy or coriaceous; veins reticulate. Scape stout, usually longer than the leaves, naked below, bearing above the middle 2–4 large sessile or shortly stalked oblong or rounded bracts, from the axils of which proceed several simple

or branched flowering peduncles, each of which usually bears 1–2 secondary bracts. Flowers numerous, large, 1–2 in. diam., golden-yellow. Sepals 5, broadly oblong. Petals 5, cuneate-obovate, emarginate, with 2–3 naked glands at the base. Receptacle broadly oblong, pilose; achenes numerous, somewhat turgid, sparingly pilose or nearly glabrous, gradually narrowed into a slender curved style.—*T. Kirk Students' Fl.* (1899) 8; *Cheesem. Man. N.Z. Fl.* (1906) 11.

South Island: Apparently confined to the central chain of the Southern Alps. Whitcombe's Pass, at the headwaters of the Rakaia River, *Haast!* *J. B. Armstrong!* *J. D. Enys!* Fitzgerald's Pass, Mount Cook district, *P. Graham!* Mount Arrowsmith, *Cockayne* and *R. M. Laing;* Franz Josef Gracier and Mount Moltke, *Cockayne.*

A very remarkable species, easily distinguished by its smooth and glabrous habit, broadly oblong leaves, rounded or cuneate at the base, and numerous yellow flowers.

7. **R. Monroi** *Hook. f. Fl. Nov. Zel.* ii (1855) 323.—Short, stout, 6–15 in. high or more, more or less silky-villous or almost glabrous. Rootstock short, clothed with the persistent bases of the old leaf-sheaths. Leaves all radical, on short stout petioles with broad sheathing bases, coriaceous or almost fleshy sometimes thinner and submembranous; blade variable in outline, 1–4 in. diam., reniform-rounded or ovate, cordate or rounded at the base, coasely crenate or crenate-lobulate. Scapes simple or sparingly branched, 1–3-flowered; bracts entire or deeply lobed. Flowers yellow, ½–1 in. diam., rarely more. Sepals 5, linear-oblong, obtuse, glabrous or silky. Petals 5–8, almost twice as long as the sepals, narrow obovate-cuneate, each with a single glandular pit at the base. Achenes numerous, forming a small globose head, usually glabrous, turgid, keeled at the back; style straight or recurved.—*T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 349; *Students' Fl.* (1899) 9; *Cheesem. Man. N.Z. Fl.* (1906) 11. R. pinguis *var.* a *Hook. f. Handb. N.Z. Fl.* (1864) 5. R. Muelleri *Buch. in Trans. N.Z. Inst.* xix (1887) 215, t. 16.

Var. **sericeus** *T. Kirk Students' Fl.* (1899) 9.—Achenes clothed with silky hairs.

Var. **dentatus** *T. Kirk l.c.* 9.—Leaves broadly ovate to ovate-lanceolate, coarsely toothed or dentate, clothed on both surfaces with strigose ferruginous pubescence, sometimes almost shaggy.

North Island: Tararua Mountains, *Buchanan!* South Island: Wairau Gorge and Tarndale, *Sinclair, T. F. C.;* Spenser Mountains, Kaikoura Mountains, *T. Kirk!* Marlborough, *Monro;* Clarence Valley, *T. F. C.;* Mount Torlesse and Upper Waimakariri, *T. Kirk! Cockayne!* Var. *sericeus:* Mount Peel, *H. H. Allan!* Kaikoura Mountains, *T. Kirk!* Var. *dentatus:* Not uncommon in mountain districts in Marlborough and Canterbury from the Clarence River southwards. 1500–4500 ft. December–January.

A very variable plant, united with *R. pinguis* by Hooker, but differing from that species in the petals being always much longer than the sepals, in the scape being usually branched and not thickened upwards, and in the longer styles to the achenes. The var. *dentatus* has a very different appearance to the typical form, and but for the occurrence of numerous intermediates might have been treated as a distinct species.

8. **R. pinguis** *Hook. f. Fl. Antarct.* i (1844) 3, t. 1.—Short, stout, usually rather fleshy, 2–10 in. high, sparingly pilose or almost glabrous. Rootstock stout, with numerous fleshy rootlets. Leaves all radical, on long stout petioles with stout sheathing bases; blade 1–3 in. diam., reniform, deeply crenate-lobed. Scape as long or longer than the leaves, stout, thickened upwards, naked or with 1–2 bracts above the middle,

1-flowered. Flower 1 in. diam., yellow. Sepals 5–6, oblong. Petals 5–8, obovate or linear-oblong, hardly as long as the sepals, with 1–3 glandular pits towards the base. Receptacle broadly oblong. Achenes very numerous, small, glabrous; style short, straight, with 3 narrow wings at the base. —*T. Kirk Students' Fl.* (1899) 10; *Cheesem. Man. N.Z. Fl.* (1906) 12. R. pinguis *var.* b *Hook. f. Handb. N.Z. Fl.* (1864) 5.

Var. **pilosus** *Hook. f. Fl. Antarct.* i (1844) 3.—Smaller, more hairy. Petals linear, always furnished with 3 glandular pits.

Var. **rhombifolius.**—Much smaller, 1–3 in. high. Leaves rhomboid-cuneate, 3–5-fid.

Auckland and Campbell Islands: Not uncommon in boggy places on the hills, ascending to 1500 ft., *Hooker! Filhol! T. Kirk! B. C. Aston! R. M. Laing!*

9. **R. Grahami** *Petrie in Trans. N.Z. Inst.* xlvi (1914) 32.—Short, stout, erect, thick and fleshy, 3–5 in. high. Rootstock stout, putting down many stringy rootlets. Radical leaves 3–4, seldom more; petioles long, with broad sheathing bases, the margins of which are furnished with white silky hairs. Blade 1½–2 in. diam., thick and coriaceous, glabrous, except a few silky hairs on the margins, reniform in outline, cut down nearly to the base into 3 broadly cuneate segments which are again cut and lobed. Scape rather longer than the leaves, 1–3-flowered; cauline leaves 1–2, similar to the radical, but smaller but less divided. Flowers large for the size of the plant, ½–1 in. diam., bright-yellow. Sepals 5, broadly oblong, obtuse, silky externally. Petals 5–10, narrow-obovate, obtuse, a glandular pit near the base; stamens very numerous, in several series. Receptacle broadly oblong or nearly orbicular. Achenes somewhat turgid, shortly 2-winged at the base; style short, curved.

South Island: Mount Cook district—Coronet Peak, head of Tasman Valley; rocks of Aiguille Roque, south of Malte Brun, *P. Graham*, 8000 ft. alt.

This, which appears to be a perfectly distinct species allied to *R. pinguis*, was discovered by Mr. P. Graham, chief guide to the Hermitage, who sent flowerless specimens to me in 1910 collected on Coronet Peak. Much more complete material is required before a satisfactory diagnosis can be prepared.

10. **R. nivicola** *Hook. Ic. Plant.* (1844) tt. 571, 572.—Erect, usually rather slender, paniculately branched above, 2–3 ft. high, more or less covered with long soft white spreading hairs or nearly glabrous. Rootstock short, stout. Radical leaves on long petioles 4–12 in. long with broad sheathing bases; blade 3–6 in. diam. or even more, cordate-reniform, more or less deeply 3–7-lobed, lobes broadly cuneate, inciso-crenate. Cauline leaves deeply cut and lobed, upper laciniate. Flowers many, large, golden-yellow, 1–1½ in. diam. Sepals 5, linear-oblong, pilose. Petals usually numerous, 8–15, narrow cuneate-obovate, emarginate, each with a single glandular pit near the base. Achenes forming a small rounded head, glabrous, turgid; style straight, hooked at the tip.—*Hook. f. Fl. Nov. Zel.* i (1853) 8; *Handb. N.Z. Fl.* (1864) 5; *T. Kirk Students' Fl.* (1899) 8; *Cheesem. Man. N.Z. Fl.* (1906) 12; *Ill. N.Z. Fl.* i (1914) t. 4. R. reticularis *Col. in Trans. N.Z. Inst.* xx (1888) 188.

North Island: Mount Egmont, abundant, *Dieffenbach, Buchanan! T. F. C.;* Tongariro, Ngauruhoe, and Ruapehu, *G. Mair! H. Hill! T. F. C.;* Kaimanawa Mountains, *B. C. Aston!* South Island: Marlborough—Mount Stokes, *J. H. Macmahon!* 3000–6000 ft.

A remarkably graceful and beautiful plant. It is a great ornament of the subalpine flora of Mount Egmont, where it is more abundant than in any other locality known to me.

occupied R. geraniifolius Forst. 1788.

11. **R. geraniifolius** *Hook. f. Fl. Nov. Zel.* i (1853) 9, t. 3.—Erect, slender, sparingly branched, 1–2 ft. high, glabrous or occasionally villous with long white hairs, especially on the petioles. Radical leaves few, on long slender petioles 3–6 in. long; blade 2–4 in. diam., broadly reniform in outline, deeply 3–5-lobed, sometimes to the very base; lobes either cuneate and crenate-toothed or -lobed or again deeply divided into narrow-linear segments. Cauline leaves sessile, usually much and finely divided. Flowers few, seldom more than 3, ½–1 in. diam., yellow. Sepals 5, oblong, glabrous or very slightly pilose. Petals usually numerous, 8–15, linear-oblong, rounded at the tip, with a single basal gland. Achenes forming a small globose head, glabrous, turgid; style short, subulate.—*Handb. N.Z. Fl.* (1864) 5; *T. Kirk Students' Fl.* (1899) 9; *Cheesem. Man. N.Z. Fl.* (1906) 13. R. verticillatus *T. Kirk l.c.* 13.

North Island: Mount Hikurangi, *Colenso;* western slopes of Tongariro and Ruapehu, *T. F. C.;* summit of Mount Hauhungatahi, *Spencer!* Ruahine Mountains, *Colenso! Olsen! Petrie! B. C. Aston!* Tararua Mountains, *Buchanan! Arnold! W. Townson!* South Island: Mountains of Nelson, not uncommon as far south as Lake Tennyson, *Monro, T. F. C.;* Mount Murchison, *W. Townson!* Marlborough—Mount Stokes, *J. H. Macmahon!* Altitudinal range 2500–5000 ft. December–January.

Closely allied to the preceding species, but easily distinguished by the smaller size, more slender habit, fewer leaves (which are often very finely cut), fewer and smaller flowers, and by the petals being usually rounded at the tip. Mr. Kirk's *R. verticillatus* is based upon a single imperfect specimen, without locality, in Mr. Buchanan's herbarium. I consider that it is a small one-flowered state of *R. geraniifolius*, with which it exactly agrees in habit, pubescence, and flowers, differing only in the more rounded leaf-segments, a character of little importance in a species with such variable foliage.

12. **R. Enysii** *T. Kirk in Trans. N.Z. Inst.* xii (1880) 394.—Slender, leafy, glabrous, 6–15 in. high. Rootstock rather stout, with numerous fibrous rootlets. Leaves all radical, numerous; petioles 2–6 in. long, grooved; blade 1–3 in. diam., 3–5-foliolate or biternate; leaflets long-stalked, very variable in size and amount of cutting, sometimes large and rounded, toothed or 3–5-lobed, at other times smaller and cut to the base into 3–5 narrow-cuneate incised toothed or lobed segments, occasionally pinnately divided. Scapes 1–5, longer than the leaves, simple or rarely with 1–2 short branches, naked or with a single stalked or sessile variously divided cauline leaf. Flower ½–1 in. diam. Sepals 5, broadly ovate. Petals usually 5, rarely more, broadly obovate, with a single basilar gland. Achenes forming a small rounded head, numerous, turgid, glabrous; style short, stout, straight or curved.—*Students' Fl.* (1899) 13; *Cheesem. Man. N.Z. Fl.* (1906) 14; *Ill. N.Z. Fl.* i (1914) t. 5.

South Island: Canterbury—Ravines in the middle and upper portion of the Waimakariri River basin, from Bealey to Mount Torlesse, *T. Kirk, T. F. C;* Mount Oxford, *J. A. Holloway;* Mount St. Bernard, *A. Wall.* Otago—Near Lake Harris, *T. Kirk* (Students' Fl. (1899) 13). Altitudinal range 2000–4000 ft. December–February.

In the first edition of this work I included within the circumscription of this species Buchanan's *R. tenuis* (Trans. N.Z. Inst. xx (1888) 255, t. 12), said to have been gathered by him on the East Taieri Hills, Otago, and at Masterton; but I have been unable to obtain specimens from either locality, and as Buchanan's plate differs from the typical state of *R. Enysii* in the more pinnately divided leaves I have thought it best to exclude it for the present. I have retained, however, Mr. Kirk's Lake Harris locality, on the ground that Mr. Kirk, from his frequent visits to the Upper Waimakariri, was perfectly well acquainted with *R. Enysii*, and not at all likely to confound another plant with it.

13. **R. tenuicaulis** *Cheesem. in Trans. N.Z. Inst.* xvii (1885) 235.—Very slender, erect, sparingly pilose or nearly glabrous, 4–18 in. high. Rootstock slender, with numerous fleshy rootlets. Leaves all radical, on slender petioles 2–6 in. long; blade ½–1½ in. diam., about reniform in outline, cut to the base into 3, rarely 5, broadly cuneate divisions, which are deeply and irregularly 2–3-lobed; lobes narrow, often again toothed. Scape very slender, grooved, 1-flowered, usually with 2–3 simple or variously cut or lobed bracts about the middle. Petals 5, linear, acute. Achenes 5–20, loosely packed, spreading, shortly stipitate, fusiform, gradually narrowed into a long spirally recurved style.—*T. Kirk Students' Fl.* (1899) 14; *Cheesem. Man. N.Z. Fl.* (1906) 14.

North Island: Tararua Mountains—Mount Holdsworth, *Cockayne;* Mount Hector, *B. C. Aston* and *Petrie!* South Island: Nelson—Boundary Peak, *W. Townson.* Canterbury—Mountains above Arthur's Pass, *T. F. C.* Otago—Ben Lomond, *W. Wilcox;* Eyre Mountains, *Poppelwell;* Garvie Mountains, *Crosby Smith;* Swampy Hill, Lee Stream, Mount Kyeburn, Clinton Saddle, *Petrie!*

A very curious species, remarkable for the fusiform achenes and long spirally recurved style.

14. **R. Haastii** *Hook. f. Handb. N.Z. Fl.* (1864) 6.—A very remarkable stout fleshy or coriaceous glaucous plant, 2–6 in. high, glabrous except the leaf-sheaths, which are usually villous with long hairs. Rootstock stout and fleshy, often 6 in. long and as thick as the thumb, viscid and milky when bruised, horizontal, giving off numerous long and stout rootlets as thick as whipcord. Radical leaves 1 or 2; petioles stout, fleshy, tapering downwards, 2–6 in. long; blade 2–4 in. diam., broadly reniform or obicular in outline, palmately cut to the base into 5–7 deeply and irregularly incised and lobed segments. Scape very thick and fleshy, grooved when dry, naked below, furnished above with 1–3 sessile cauline leaves which are deeply cut into linear lobes, forming a leafy involucre to the flowers. Peduncles 1–3, barely exceeding the cauline leaves, 1-flowered. Flowers 1–1½ in. diam., yellow. Sepals 5, oblong, glabrous or nearly so. Petals 8–15, narrow-cuneate; gland single, basilar. Receptacle swollen, papillose. Achenes forming a rounded head ¾ in. diam., glabrous, turgid; style flattened, pointed, very broad at the base, the margins continued down the front and back of the achene as wings.—*T. Kirk Students' Fl.* (1899) 10; *Cheesem. Man. N.Z. Fl.* (1906) 14.

South Island: Bare shingle-slopes on the mountains, not uncommon from the south of Nelson (Wairau Valley) to Central Otago. Altitudinal range 3000–6000 ft. December–January.

A very singular plant, quite unlike any other. I do not find that Otago specimens have their leaves less divided than those from Canterbury and Nelson, as stated by Kirk in "The Students' Flora."

15. **R. crithmifolius** *Hook. f. Handb. N.Z. Fl.* (1864) 6.—Small, perfectly glabrous, stout, fleshy, glaucous, stemless; rootstock short, stout, sending down numerous fleshy rootlets. Leaves all radical, 2–4 in. long; petiole ½ the length, channelled, sheathing at the base. Lamina 1½–3 in. diam., reniform in outline, biternately multifid; ultimate segments short, linear, $\frac{1}{10}$ in. long, obtuse. Scape stout, fleshy, erect, shorter than the leaves, ½–1 in. long, 1-flowered; flower ¾ in. diam. Sepals 5, linear-oblong. Petals 5, linear-obcuneate, slightly emarginate, each with a singular grandular pit at the base. Stamens numerous. Achenes 12–20, forming a rounded head ⅓ in. diam.—*T. Kirk Students' Fl.* (1899) 11; *Cheesem. Man. N.Z. Fl.* (1906) 15.

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A GENUS OF RANUNCULACEÆ HITHERTO UNRECORDED FOR

Achenes

Achenes fusiform, stipitate
Petals 5. linear, acute

achenes
sepals 3-5. deciduous
petals 5.
ovule pendulous. raphe dorsal

ovules ascending
Petals 3 to many

13. **R. tenuicaulis** *Cheesem. in Trans. N.Z. Inst.* xvii (1885) 235.—Very slender, erect, sparingly pilose or nearly glabrous, 4–18 in. high. Rootstock slender, with numerous fleshy rootlets. Leaves all radical, on slender petioles 2–6 in. long; blade $\frac{1}{2}$–$1\frac{1}{2}$ in. diam., about reniform in outline, cut to the base into 3, rarely 5, broadly cuneate divisions, which are deeply and irregularly 2–3-lobed; lobes narrow, often again toothed. Scape very slender, grooved, 1-flowered, usually with 2–3 simple or variously cut or lobed bracts about the middle. Petals 5, linear, acute. Achenes 5–20, loosely packed, spreading, shortly stipitate, fusiform, gradually narrowed into a long spirally recurved style.—*T. Kirk Students' Fl.* (1899) 14; *Cheesem. Man. N.Z. Fl.* (1906) 14.

(*Reprinted from* NATURE, *July* 2, 1932.)

A GENUS OF RANUNCULACEÆ HITHERTO UNRECORDED FOR NEW ZEALAND

DR. W. A. SLEDGE, of the University of Leeds, who has recently brought home from New Zealand a collection of dried plants, kindly allowed me to look through his surplus stock of species belonging to *Ranunculus* and to take what flowers I liked for examination, as I am especially interested in the petal of this genus. One species, *Ranunculus tenuicaulis* Cheesem., appealed to me particularly on his information that he had noticed it when growing to have reddish flowers. Red colouring is unusual among buttercups.

On soaking out the two flowers available, I found on investigation that there was no sign of a double perianth. Thinking possibly that the sepals might have fallen, as these flowers were fully mature, Dr. Sledge supplied me with younger ones from his mounted sheet. These likewise showed a simple (monoseriate) perianth. Further, there was no indication of any nectary on the perianth segment or tepal, to use a non-committal term. The petal of *Ranunculus* is invariably characterised by the possession of such. The perianth, then, of this interesting plant is probably a petaloid calyx of five sepals. The small flower is borne singly on a short stalk arising from a whorl of three somewhat foliaceous bracts suggestive of the involucre of *Anemone*. The carpel is of a type quite unusual for *Ranunculus*, having a long spirally recurved style. The material at my disposal has scarcely been sufficient to ascertain definitely as to the exact manner in which the ovule is borne, but such evidence as has been obtained points strongly to a suspended rather than a basally attached one. Dr. Sledge has since satisfied himself that the ovule is suspended.

The examination of these flowers, then, certainly rules out *Ranunculus* as the genus to which this plant belongs, and suggests that the *Ranunculus tenuicaulis* of Cheeseman may be a species of *Anemone*. At any rate, it is a member of a Ranunculaceous genus hitherto unrecorded for New Zealand. So far, the only genera of this attractive family occurring in these islands are *Ranunculus* itself, by far the largest

with some 40 species, *Clematis* (9 spp.), *Myosurus* (one sp.), and *Caltha* (2 spp.).

The question naturally arises: How came the late Mr. T. F. Cheeseman to place this plant in the genus *Ranunculus*? Dr. Sledge in the letter below sheds some light on this. He hopes to secure more material of this interesting plant, and when it is available, we may then be able to determine exactly its systematic position.

JOHN PARKIN.

Blaithwaite,
Wigton, Cumberland,
May 25.

I MAY perhaps supplement Mr. Parkin's interesting observations on *Ranunculus tenuicaulis* Cheesem. This montane species is rare throughout New Zealand and of most frequent occurrence in Otago, in which province I collected it. Single stations are also given in Cheeseman's "Manual of the New Zealand Flora" (Ed. 2, p. 442) for Canterbury and Nelson, whilst in the North Island the plant has been collected in the Tararua Mts. The plant was first collected by Cheeseman in 1883 at Arthur's Pass in the Southern Alps of Canterbury, and there are single authentic specimens of this gathering in the herbaria at Kew and the British Museum. We are indebted to the authorities at Kew and the British Museum for descriptions of these plants, both of which are in ripe fruit and lack perianth members, as does a second specimen at Kew collected by Kirk in the same locality a year later. In his original description of the species (*Trans. N.Z. Inst.*, vol. 17, 1884) Cheeseman writes, "Petals not seen"; and the inadequate references to the flowers in later descriptions in the "Manual", and particularly the absence of any reference to the very unusual and pronounced reddish colour of the perianth, would suggest that he never saw the plant in flower. His description of the achenes is more complete, and in the second edition of the "Manual" he adds the following note: "A very curious species, remarkable for the fusiform achenes and long spirally recurved styles". These "remarkable" facts are significant in view of Mr. Parkin's observations and the probable affinity of this plant with the genus *Anemone*.

W. A. SLEDGE.

Botany Dept.,
University, Leeds,
May 25.

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South Island: Nelson — Shingle-slopes at the Wairau Gorge, alt. 6000 ft., *W. T. L. Travers.* Canterbury—Shingle-slopes above the Cameron River, Mount Arrowsmith district, alt. 5000 ft., *R. M. Laing!*

16. **R. chordorhizos** *Hook. f. Handb. N.Z. Fl.* ii (1867) 723.—Small, stout, fleshy and coriaceous, 2–3 in. high, everywhere perfectly glabrous. Rootstock short, stout, putting down long and stringy fleshy rootlets. Leaves all radical, spreading and recurved; petioles stout, 1–2 in. long, with broad sheathing bases; blade ½–1½ in. diam., suborbicular in outline when spread out, 3-lobed, or 3-partite to the base, segments obovate-spathulate or cuneate, sometimes petiolulate, incised or again lobed, upper surface pitted or wrinkled when dry. Scapes usually solitary but sometimes 2–3, short, not exceeding the petioles, naked, 1-flowered. Flowers large for the size of the plant ¾–1¼ in. diam. Sepals 5, oblong, not toothed. Petals 5 in all the flowers examined, nearly twice as long as the sepals, linear-obovate, with 1–3 glandular pits near the base. Achenes forming a small globose head, rounded, turgid, glabrous; style as long as the achene, curved, subulate. — *T. Kirk Students' Fl.* (1899) 10; *Cheesem. Man. N.Z. Fl.* (1906) 15. T.N.Z.I. So. 189.

South Island: Canterbury—Macaulay River and Mount Somers, *Haast* (Handbook); Mount Hutt, *A. Wall:* Lake Ohau, *Buchanan!* Mount Winterslow, *R. M. Laing.* Otago — Mount Kyeburn and Mount St. Bathan's, *Petrie.* Altitudinal range 3000–5000 ft. December–January.

A very peculiar species. Although closely allied to *R. paucifolius*, it differs in the smaller size of the plant, and in the size, shape, and cutting of the leaves.

17. **R. paucifolius** *T. Kirk Students' Fl.* (1899) 11. — Small, stout, coriaceous, 2–4 in. high, perfectly glabrous in all its parts. Root stout, short, vertical, putting down numerous perpendicular rootlets. Leaves 3–8, all radical, spreading; petioles short, stiff, 1–2 in. long, sheathing at the base; blade 1–2 in. diam., suborbicular or broader than long, slightly cordate or truncate or almost cuneate at the base, 3-lobed to the middle; lobes often overlapping, sharply and finely toothed or crenate, minutely pitted above when fresh. Scape very rarely more than one to a plant, short, stout, ½–¾ in. long, 1-flowered; cauline leaves wanting. Flower large for the size of the plant, 1½–2 in. diam. Sepals 5, pale-yellow, not lobed as in *R. chordorhizos*. Petals 5–8 or more. Achenes few, forming a small rounded head, turgid, glabrous; style as long as the achene, curved, subulate.—*Cheesem. Man. N.Z. Fl.* (1906) 15; *A. Wall in Trans. N.Z. Inst.* lii (1920) 90–105.

South Island: Canterbury—Debris of limestone rocks at Castle Hill, Middle Waimakariri, alt. 2500 ft., *J. D. Enys! T. Kirk, T. F. C.* October–November.

Only known from the single locality quoted above, where it is exceedingly rare, and confined to an area not exceeding 4 acres. For further information, reference should be made to Professor Wall's paper "On the Distribution and Ecology of *Ranunculus paucifolius*" (Trans. N.Z. Inst. lii (1920) 90–105). I have not seen flowering specimens, and that portion of the above description dealing with the inflorescence has been adapted from Professor Wall's paper.

18. **R. Berggreni** *Petrie in Trans. N.Z. Inst.* xix (1887) 325; *l.c.* xxxi (1899) 352, t. 26.—Small, stemless, perfectly glabrous. Rootstock stout, with numerous fleshy rootlets. Leaves all radical, coriaceous; petioles slender, flattened, ½–1 in. long; blade orbicular or reniform, with an open sinus, ½–¾ in. diam., unequally 3-lobed to the middle, rarely almost

R. simpsoni Cock. & All. T.N.Z. 57:58 1926
R. sericophyllum var. simpsoni Simp. & Thomp. T. 72.(1). 22.

3-partite; lobes rounded, irregularly crenate or crenate-lobed. Scapes 1 or 2, 1-flowered, naked, 1–3 in. long. Flowers ½–¾ in. diam. Sepals 5, ovate, margins scarious. Petals 5, obovate, rounded at the tip, with a single conspicuous gland at the base. Styles rather long, recurved. Ripe achenes not seen.—*T. Kirk Students' Fl.* (1899) 12; *Cheesem. Man. N.Z. Fl.* (1906) 16.

South Island: Otago — Carrick Range, alt. 4000 ft., *Petrie!* November–December.

A pretty and distinct little species, the exact relationship of which cannot be determined until ripe achenes are obtained.

19. **R. novae-zealandiae** *Petrie in Trans. N.Z. Inst.* xxvi (1894) 266.—Small, stout, somewhat fleshy and glaucous, perfectly glabrous. Rootstock short, stout, clothed with the remains of the old petioles; root-fibres long and thick. Leaves all radical, coriaceous, on short flattened petioles ½–1 in. long; blade ½–1¼ in. long, trifoliolate; lateral leaflets sessile, terminal long-stalked, all more or less deeply 3-lobed or -partite, sometimes to the base, segments crenate. Scapes 1–3, short, stout, naked, 1-flowered, 1–3 in. long. Flowers ½–¾ in. diam. Sepals 5, oblong, much shorter than the petals. Petals 5, obovate-cuneate, rounded at the tip, with a single broad gland near the base. Ripe achenes not seen.—*T. Kirk Students' Fl.* (1899) 13; *Cheesem. Man. N.Z. Fl.* (1906) 16. T. 72(1):21.
var. nepens. Simp. & Thom.

South Island: Otago—Rock and Pillar Range, opposite Middlemarch; Old Man Range, alt. 4000 ft., *Petrie!* November–December.

This looks like *R. Berggreni* with trifoliolate leaves; in fact, the terminal leaflet often exactly matches a small-sized leaf of that species. But it is premature to speculate as to its affinities until the ripe achenes are known.

20. **R. sericophyllus** *Hook. f. Handb. N.Z. Fl.* (1864) 6.—A handsome short stout pale-green plant 2–8 in. high, usually densely covered with long silky hairs, but sometimes nearly glabrous. Rootstock short, stout. Leaves numerous, somewhat membranous, all radical; petioles short or long, 1–5 in., with very broad membranous sheathing bases; blade ½–1½ in. long, broadly ovate in outline, tripinnatisect, ultimate divisions small, linear or linear-oblong, acute or nearly so, generally tipped with a pencil of silky hairs. Scape usually longer than the leaves, stout, erect, 1-flowered or rarely 2-flowered, naked or with an entire or laciniate bract. Flowers large, golden-yellow, 1–1½ in. diam, or even more. Sepals oblong, membranous, almost equalling the petals. Petals 5–8, usually broad, obovate-cuneate, rounded at the tip; glands generally 3, near the base. Achenes forming a rounded head 1½ in. diam., glabrous, turgid, keeled at the back; style stout, subulate.—*T. Kirk Students' Fl.* (1899) 12; *Cheesem. Man. N.Z. Fl.* (1906) 17; *Ill. N.Z. Fl.* i (1914) t. 6. T. 72(1):22. 73:155.

South Island: Canterbury—Poulter River, *Cockayne!* Browning's Pass, Mount Brewster, Hopkin's River, *Haast!* Mount Cook district, *Dixon, T. F. C.*; Copeland Pass, *Cockayne*; Haast Pass and Makaroro, *Poppelwell*; Kinloch, Wakatipu, *B. C. Aston*; Matukituki Valley, near Mount Aspiring, mountains near Lake Hawea, *Petrie!* Mackinnon's Pass, *F. G. Gibbs* and *H. J. Matthews!* Humboldt Mountains, *Cockayne!* Altitudinal range 3500–7000 ft. December–January.

An exceedingly beautiful little plant, very abundant in the Mount Cook district, where it ascends to quite 7000 ft. Mr. Petrie's specimens from near Mount Aspiring are more slender and almost glabrous, and the petals are more numerous and narrower. Dr. Cockayne's, from the Humboldt Mountains, have the leaves much less divided, with broader segments, but the petals have the 3 large glands of the type.

R. porrectus Smiths. 75: 187. 1945.

S.E. 72: 22. 1942.

21. **R. Baughani** *Petrie in Trans. N.Z. Inst.* xlv (1913) 265.—Short, stout, densely clothed in all its parts with long yellowish-white silky hairs. Rootstock stout, sometimes branched above. Radical leaves few or many; petioles stout, ¾–1½ in. long, with broad sheathing bases; blade broadly ovate-deltoid, 1–1½ in. long, 1½–2 in. broad, trifoliolate, the primary divisions again repeatedly divided; ultimate segments short, narrow linear-oblong, acute. Cauline leaves or bracts few, crowded, sessile, much less divided than the radical leaves. Scape longer than the leaves, but seldom more than 3 in. high, 1–3-flowered. Flowers 1–2 in. diam., bright-yellow. Sepals almost equalling the petals, broad, thin, obtuse, pale greenish-yellow, many-nerved, silky-villous on the outside. Petals 8–10, obovate-cuneate; glands 3, near the base. Ripe achenes not seen.

SOUTH ISLAND: Otago—Mount Balloon, on the Te Anau–Milford Track, alt. 4000–5000 ft., *Miss B. E. Baughan!*

Clearly closely related to *R. sericophyllus*, from which it differs in the 1–3-flowered scapes. I have seen very scanty material, and the above description may require amendment when a more complete series of specimens has been obtained.

22. **R. Sinclairii** *Hook. f. Handb. N.Z. Fl.* (1864) 6.—Small, slender, 2–6 in. high, sparingly pilose with long white silky hairs or almost glabrous. Rootstock stout, sometimes branched above. Leaves many, all radical, 1–4 in. long, usually soft and flaccid; petioles short, sheathing at the base; blade 1–2 in. long, ovate-oblong to linear-oblong in outline, bipinnatisect or multifid; primary pinnae 2–4 pairs, opposite, often rather distant, very variable in the amount of cutting, ultimate segments narrow-linear, rarely oblong, short, acute. Scape slender, naked, 1-flowered, much longer than the leaves. Flowers small, ½ in. diam. Sepals 5. Petals 5, nearly twice as long as the sepals, linear-obovate, with a single gland near the base. Achenes few, forming a small rounded head, turgid, glabrous; style short, straight, subulate.—*T. Kirk Students' Fl.* (1899) 11; *Cheesem. Man. N.Z. Fl.* (1906) 17.

SOUTH ISLAND: Nelson—Wairau Gorge, *W. T. L. Travers! T. F. C.;* Tarndale, *Sinclair!* (Herb. Kirk). Canterbury—Mountains in the middle Waimakariri district, *J. D. Enys, T. Kirk, T. F. C., Cockayne;* Mount Dobson, *T. F. C.* Otago—*Buchanan!* Maungatua, *Petrie!* Altitudinal range 2500–5000 ft. December–January.

A pretty little plant, too closely allied to the following, from which it is principally separated by the more finely cut leaves. Mr. Petrie's Maungatua specimens (distinguished by Kirk as var. *angustatus*) have narrower leaves and hairy scapes, and may belong to *R. gracilipes*.

23. **R. gracilipes** *Hook. f. Handb. N.Z. Fl.* (1864) 8.—Small, slender, pilose or villous with long soft hairs, especially on the petioles and scapes, 2–6 in. high. Rootstock short, rather stout, with numerous fibrous rootlets. Leaves many, all radical, 1–5 in. long, membranous, rarely subcoriaceous; petioles slender, sheathing at the base; blade linear-oblong in outline, pinnately divided; primary pinnae 2–6 pairs, entire, 3-lobed, 3-partite, or again pinnate; ultimate segments oblong, cuneate at the base, acute or subacute. Scapes 1–3, longer than the leaves, naked, slender, pilose, 1-flowered. Flower ½–¾ in. diam. Sepals 5, oblong, silky. Petals 5, linear-obovate, rounded at the tip, with a single gland near the base. Ripe achenes not seen.—*T. Kirk Students' Fl.* (1899) 12; *Cheesem. Man. N.Z. Fl.* (1906) 17.

South Island: Canterbury—Mount Dobson and Mount Cook district. *T. F. C.*; Lake Ohau, *Haast, Buchanan!* Otago—*Buchanan!* Dunstan Mountains, Mounts Ida, Pisa, Kyeburn, *Petrie!* Humboldt Mountains, *Cockayne!* Stewart Island: *Thomson!* Altitudinal range 2500–5000 ft., but descending almost to sea-level in Stewart Island. December–January.

An exceedingly variable species, only to be distinguished from *R. Sinclarii* by the narrower outline of the leaves, the more numerous shorter pinnae, which are usually much less divided, and in small specimens often nearly entire, and by the broader ultimate segments. Many specimens are quite intermediate, and might be referred to either species.

24. **R. Urvilleanus** *Cheesem. n. sp.*—Tall, slender, branched at the base, 2–3 ft. high; stems and leaves more or less covered with soft spreading white hairs. Radical leaves numerous, on slender petioles often over a foot in length. Blade 1–3 in. long or more, trifoliolate or 3-ternately divided, not palmate-partite. Central segment conspicuously stalked, and the whole of the segments cut into numerous acute divisions. Cauline leaves on shorter petioles, and their divisions on less evident stalks. Flowering stem branched above, bearing several rather small bright-yellow flowers $\frac{1}{2}$ in. diam. Sepals 4 or 5, shorter than the petals, reflexed, silky externally. Petals 5, oblong, obtuse, a single glandular pit at the base. Achenes forming a rounded head, glabrous, compressed, margined; style rather long, strongly curved.—R. hirtus *var.* elongatus *Cheesem. Man. N.Z. Fl.* (1906) 19.

North Island: North Cape Peninsula, not uncommon in marshy places, *T. F. C., H. Carse!* low grounds by Whangaroa Harbour, *T. F. C.*; Bay of Islands, abundant on the shores, *D'Urville* (1828); Little Barrier Island, *T. F. C.*

This differs from any of the forms of *R. hirtus* in the much greater size, more slender habit, more compressed achenes, with much more curved styles. It is doubtless the plant collected by D'Urville on the shores of the Bay of Islands in 1828, and referred by A. Richard to the northern *R. acris* ("Flore de la Nouvelle-Zélande," 289). But *R. acris* is at once distinguished by the palmate-partite or digitate leaves, and there can be no question of the distinctness of the two species.

80. nom. nud.?

25. **R. hirtus** *Banks and Sol. ex Forst. f. Prodr.* (1786) n. 525.—Stout or slender, erect or rarely decumbent, more or less branched, 6–24 in. high, usually clothed with soft spreading or rarely appressed hairs. Radical leaves numerous, on petioles 1–3 in. long, 3-foliolate; leaflets usually stalked, oblong to broadly ovate, rounded or cuneate at the base, coarsely and irregularly toothed or 3–5-lobed, or again 3-partite. Flowering stems usually branched, with several cauline leaves, the lower of which are similar to the radical, the upper smaller, more sessile, and less cut or entire. Flowers small, seldom more than $\frac{1}{2}$ in. diam. Sepals 5, oblong, reflexed, fugacious, shorter than the petals. Petals 5, obovate, with a single gland near the base. Achenes forming a small rounded head, glabrous, compressed, margined; style short, hooked.—*A. Cunn. Precur.* (1838) n. 634; *Raoul Choix* (1846) 47; *Hook. f. Fl. Nov. Zel.* i (1853) 9; *T. Kirk Students' Fl.* (1899) 14; *Cheesem. Man. N.Z. Fl.* (1906) 18. R. plebeius *R. Br. ex DC. Syst. Veg.* i (1818) 288; *Hook. f. Handb. N.Z. Fl.* (1864) 7; *Benth. Fl. Austral.* i (1863) 13.

Var. **gracilis** *Cheesem. Man. N.Z. Fl.* (1906) 19.—Slender, erect or suberect, 6–10 in. high, sparingly covered with silky appressed hairs. Leaves 3-foliolate; leaflets often long-stalked, ovate-cuneate, irregularly and sparingly toothed or lobed. Flowers large, $\frac{1}{2}$–$\frac{3}{4}$ in. diam. Achenes larger, with a longer style. Mountain districts of the South Island, 3000–4500 ft.

R. crosbeyi Colen. nom. nud. Rep. Bot. Stew. Is. 54.

Var. **stoloniferous** *T. Kirk Students' Fl.* (1899) 14.—Stems very slender, procumbent and rooting at the nodes. Leaves 3-fid. Flowers and fruit very small. Damp subalpine localities in the South Island, not uncommon.

North, South, Stewart, and Chatham Islands: Abundant throughout, ascending to 4500 ft. October–January. Also plentiful in Australia.

A very variable plant. The typical state can be recognized by the copious soft spreading hairs, sparingly branched stem, and trifoliolate leaves with broad coarsely toothed or lobed segments. Mr. Kirk's var. *robustus* (Students' Fl. (1899) 14) is simply a large state with the stem more copiously branched and the achenes slightly larger, and passes imperceptibly into the usual form.

26. **R. recens** *T. Kirk Students' Fl.* (1899) 13.—Short, stout, depressed, seldom more than $1\frac{1}{2}$ in. high, sparingly clothed with stiff white hairs, especially on the petioles and upper surfaces of the leaves. Rootstock stout, with long stringy rootlets, often branched above. Leaves all radical, rosulate, thick and coriaceous; petioles broadly sheathing at the base, flattened, $\frac{1}{4}$–1 in. long; blade ovate or rounded in outline, more or less deeply 3-lobed or trifoliolate, segments or leaflets irregularly cut and lobed, acute or obtuse. Scape very short and often almost absent, usually hispid with white hairs. Flowers minute, $\frac{1}{3}$ in. diam. Sepals 5, linear or linear-oblong, acute. Petals 5, hardly longer than the sepals, linear-spathulate, obtuse at the tip, gland just below the middle. Achenes ovate-orbicular, red-brown when ripe, slightly compressed; margin thickened, blunt; face minutely pitted; style very short, stout, minutely hooked at the tip.—*Cheesem. Man. N.Z. Fl.* (1906) 19.

North Island: Taranaki—Moist places on sandhills near Hawera, *T. F. C.* South Island: Otago—*Buchanan! Petrie!* (Herb. Kirk); Sandymount, near Dunedin, *W. Martin;* sandhills near Fortrose, Southland, *B. C. Aston! H. J. Matthews!* (Herb. Petrie). Probably not uncommon, but easily overlooked.

A very curious little species. The type specimens in Kirk's herbarium are very imperfect, and in fruit only. Those in Petrie's herbarium, collected by B. C. Aston and H. J. Matthews, show both flower and fruit, and have enabled me to draw up a more complete description. My own specimens, collected at Hawera more than thirty years ago, have smaller and less divided leaves, but the habit is the same, and the achenes exactly match those of the southern plant. Mr. Kirk was in error in supposing the species to be alpine. All the specimens I have seen have been obtained from sandhills near the sea.

27. **R. Kirkii** *Petrie in Trans. N.Z. Inst.* xix (1887) 323, *and* xxxi (1899) 352, t. 25.—Slender, sparingly covered with soft white hairs 3–6 in. high. Rootstock stout, with numerous thick fleshy roots. Radical leaves on long slender petioles 1–3 in. long; blade sometimes linear-spathulate and entire, but usually 3-foliolate; leaflets stalked, rounded-ovate, entire or 3-lobed, coriaceous. Scapes several, simple or branched, 3–5 in. high; cauline leaves or bracts few, spathulate. Flowers small. Sepals 5, oblong-lanceolate. Petals 5, linear-oblong, rounded at the tip, clawed at the base, with a gland just above the claw. Achenes few, slightly compressed, keeled; style subulate, hooked at the tip.—*T. Kirk Students' Fl.* (1899) 15 (*in part*); *Cheesem. Man. N.Z. Fl.* (1906) 19.

Stewart Island: Swamps at Paterson's Inlet, *Petrie! Thomson!* valleys of the Rakiahua and Freshwater Rivers, open ground at Port Pegasus, abundant, but local, *Cockayne.*

I regret that I have been unable to obtain additional material of this species since the publication of the first edition of this work, for the above description is imperfect in several respects. Mr. Kirk considers that its nearest ally is *R. lappaceous*, but I can find little affinity with that plant. It is much nearer to *R. ternatifolius.* The figure of the species given in Trans. N.Z. Inst. xxxi (1899) is not characteristic of any specimens I have seen.

R. maculatus Cheesem. & all. Sb: 33. 1926.

28. **R. lappaceus** *Smith in Rees' Cyplop.* xxix (1819) n. 61.—Short, stemless, more or less hairy or villous, 2–10 in. high. Rootstock short, stout, sometimes branched at the top. Leaves numerous, usually all radical, on petioles ½–3 in. long; blade ¼–1½ in. diam., cuneate or ovate or rounded in outline, sometimes entire or coarsely toothed, but more frequently 3–5-lobed or -partite, less commonly 3-foliolate or pinnately divided; lobes or segments generally toothed or crenate. Scapes 1 to many, usually leafless and 1-flowered, 1–9 in. high, generally much longer than the leaves, densely clothed with spreading or appressed hairs. Flowers very variable in size, often a rich golden-yellow. Sepals 5, pilose, spreading. Petals 5, obovate; gland at the base. Achenes forming a small rounded head, compressed or rarely slightly turgid, glabrous, margined; style short, recurved.—*Hook. f. Fl. Tasm.* i (1860) 6; *Handb. N.Z. Fl.* (1864) 7; *Benth. Fl. Austral.* i (1863) 12; *T. Kirk Students' Fl.* (1899) 15; *Cheesem. Man. N.Z. Fl.* (1906) 20.

Var. **macrophyllus** *T. Kirk Students' Fl.* (1899) 15.—Larger. Leaves with petioles 2–4 in. long; blade ¾–1½ in. diam., obscurely 3-lobed; margins crenate or toothed. Scapes 3–8 in. high. Flowers large.

Var. **multiscapus** *Hook. f. Handb. N.Z. Fl.* (1864) 7.—Petioles shorter, ¼–1½ in.; blade smaller, ¼–¾ in. diam., ovate or rounded, cuneate at the base, toothed or 3-lobed or 3-partite. Scapes numerous.—R. multiscapus *Hook. f. Fl. Nov. Zel.* i (1853) 9, t. 5. R. muricatulus *Col. in Trans. N.Z. Inst.* xxiii (1891) 381 (still smaller, with the leaves occasionally entire).

Var. **pimpinellifolius** *Benth. Fl. Austral.* i (1863) 12.—R. pimpinellifolius *Hook. Journ. Bot.* i (1834) 243; *Ic. Plant.* (1840) t. 260.

Var. **villosus** *T. Kirk Students' Fl.* (1899) 15.—1–3 in. high, densely villous or silky in all its parts. Scape usually shorter than the leaves. Achenes slightly turgid.

North, South, and Stewart Islands: The var. *multiscapus* abundant from Hawke's Bay and Taupo southwards, and ranging from sea-level to 4500 ft. November–March. The remaining varieties not uncommon in mountain districts in the South Island.

R. lappaceus is probably the most variable of the New Zealand *Ranunculi*, and certainly the most difficult to characterize. The above arrangement of its forms is mainly that given by Kirk, with the addition of the Tasmanian variety *pimpinellifolius*, which occurs in several places in the mountains of the South Island. But the student must bear in mind that the distinctions used to separate the so-called varieties are purely arbitrary, every one of them being connected with the others by numerous intermediates. It is often difficult to separate some of the aberrant forms from the allied species, particularly from *R. foliosus*, when, as sometimes happens, the scape is branched, and the peduncles shorter than the leaves. *R. hirtus* can generally be distinguished by its greater size, more divided leaves, branched flowering stem, and reflexed sepals.

29. **R. foliosus** *T. Kirk Students' Fl.* (1899) 14.—Stout or slender, 4–12 in. high, more or less hirsute with long soft tawny hairs, especially on the scapes and petioles. Rootstock short, stout. Stems or branches often numerous, erect or decumbent, leafy. Radical leaves numerous, on long petioles 3–6 in. long, with broad sheathing bases; blade ½–1½ in. diam., variable in outline, obovate or ovate or rounded, cuneate or rounded at the base, rarely reniform with a cordate base, coarsely toothed or incised, or 3-lobed with the lobes again toothed or cut, both surfaces covered with long soft appressed hairs. Cauline leaves often opposite, or clustered towards the tops of the stems, like the radical but smaller and on shorter petioles. Peduncles variable, always shorter than the leaves; in large specimens some often spring from among the radical leaves, and are

R. carsei Petrie T. St. 11. 1926.

3–6 in. high; others from the axils of the cauline leaves, and are seldom more than ½–3 in. Flower ⅓–½ in. diam. or more. Sepals 5, oblong, spreading. Petals 5, narrow-oblong, with a gland near the base. Achenes smooth, somewhat turgid, hardly compressed; style short, subulate.—*Cheesem. Man. N.Z. Fl.* (1906) 21.

South Island: Nelson—Fowler's Pass, *T. Kirk!* near Lake Tennyson, *T. F. C., R. M. Laing.* Canterbury—Broken River, *T. F. C.;* Hopkins River, *Haast;* Tasman Valley, *T. F. C.;* Mount Arrowsmith, *Cockayne.* Westland—Otira Valley, *Cockayne;* Teremakau, *Petrie!* Otago—Mountain valleys of the interior, not uncommon, *Petrie!* Clinton Valley, *Cockayne;* Routeburn, *Poppelwell;* Garvie Mountains and interior of Southland, *Crosby Smith.* Altitudinal range 1000–4000 ft. December–March.

An exceedingly variable plant, but on the whole readily distinguished by the branched stems and leafy habit, opposite or clustered cauline leaves often with very broad sheathing bases, short stout peduncles which are much shorter than the leaves, and the somewhat turgid or but slightly compressed achenes. Mr. Kirk's type specimens are small and in poor condition, and do not represent the usual state of the species.

30. **R. subscaposus** *Hook. f. Fl. Antarct.* i (1844) 5.—Short, stout, erect or nearly so, 4–8 in. high, rarely more, covered in all its parts with short rigid appressed fulvous hairs. Rootstock short, stout. Radical leaves on slender petioles 3–6 in. long; blade ovate- or deltoid-cordate; 1–1½ in. diam., covered with spreading or appressed hairs, 3-partite to the base; segments cuneate, more or less deeply and irregularly 3–7-lobed or toothed, lobes acute. Scape or stem shorter than the leaves, 1-flowered; cauline le ves 1–3. Flowers small, ⅓–½ in. broad. Sepals 5, spreading. Petals 5, equalling the calyx or shorter than it, obovate-oblong; gland slightly below the middle. Achenes forming a small rounded head, compressed, margined, with a short slightly hooked style.—*T. Kirk Students' Fl.* (1899) 15; *Cheesem. Man. N.Z. Fl.* (1906) 21.

Campbell Island: *Lyall, Filhol! Rathouis! T. Kirk! R. M. Laing!*

Very close to the preceding, which has larger, broader, and more rounded leaves.

31. **R. aucklandicus** *A. Gray Bot. U.S. Expl. Exped.* i (1854) 8.—Rather stout, leafy, 6–14 in. high, strigose-hirsute in all its parts. Rootstock short, stout. Radical leaves on long petioles 3–8 in. long, sheathing at the base, petioles strigose-hirsute; blade 1–1½ in. diam., rounded-reniform in outline, silky strigose on both surfaces, 3-cleft to or beyond the middle, with the sinuses usually closed; lobes broadly cuneate, again 2–3-lobed or coarsely cut and incised. Scapes 1–3, rather stout, 6–10 in. high, usually with 1–2 cauline leaves towards the base. Flowers several to a scape, ½–¾ in. diam. Sepals 5, narrow-oblong, silky externally. Petals 5, oblong, ½ as long again as the sepals; a single gland a little distance above the base. Fruiting-receptacle ¼–⅓ in. long, cylindric or club-shaped, conspicuously papillose, hairy. Achenes ovate, compressed, not margined, slightly villous with long hairs; style short, straight or very slightly hooked.—*T. Kirk Students' Fl.* (1899) 16; *Cheesem. Man. N.Z. Fl.* (1906) 22; *Ill. N.Z. Fl.* i (1914) t. 7. R. Hectori *T. Kirk Students' Fl.* (1899) 16.

See Rep. Stens. Jo. 11.398, 1909.

Auckland Islands: *U.S. Exploring Expedition;* not uncommon in wet ground near the sea, *T. Kirk! Cockayne! B. C. Aston! J. S. Tennant! Field!*

The nearest relative of *R. aucklandicus* is undoubtedly *R. subscaposus*, which differs only in its smaller size and ovate-deltoid more acutely lobed leaves, which are usually 3-partite to the base. I think there can be no doubt that Kirk's *R. Hectori* is nothing but a mere state with longer petioles and a branched scape.

32. **R. Cheesemanii** *T. Kirk Students' Fl.* (1899) 17.—Stems much branched, stout, grooved, prostrate, often rooting at the nodes, sparingly strigose-pubescent, especially on the leaf-sheaths. Radical and cauline leaves alike; petioles very short, broadly sheathing at the base; blade $\frac{1}{3}$–$\frac{3}{4}$ in. diam., broadly cuneate, 3-lobed or -toothed at the tip; surfaces glabrous or nearly so. Peduncles axillary, $\frac{1}{2}$–1 in. long. Flowers not seen. Fruiting-receptacle small, glabrous, papillose. Achenes few, turgid, glabrous; style short, straight or hooked.—*Cheesem. Man. N.Z. Fl.* (1906) 23.

South Island: Marlborough and Nelson—Upper Awatere, common in shallow streams, *Foweraker* and *Cockayne;* Fowler's Pass, *T. Kirk!* Upper Clarence Valley, *T. F. C.;* Mount Arrowsmith district, *Cockayne* and *R. M. Laing.* Altitudinal range 2000–3500 ft. December–February.

I am imperfectly acquainted with this species, which may prove to be a state of *R. foliosus.*

33. **R. ternatifolius** *T. Kirk in Trans. N.Z. Inst.* x (1878) App. 29.—Slender, sparingly pilose with long weak hairs, 1–4 in. high. Stems or branches numerous, long, weak, procumbent or prostrate, often rooting at the nodes, sometimes interlaced and matted. Leaves on long slender petioles 1–3 in. long; blade 3-foliolate or 3-ternate, primary leaflets on long petiolules, segments small, entire or 3-lobed, acute. Peduncles $\frac{1}{4}$–1 in. long, usually on the branches opposite the leaves. Flowers minute, $\frac{1}{6}$–$\frac{1}{4}$ in. diam. Sepals 5, ovate, pilose, membranous. Petals 5, linear-oblong, clawed at the base, with a single gland above the claw. Achenes 5–10, slightly compressed, glabrous; style short, stout, hooked at the tip.—*T. Kirk Students' Fl.* (1899) 18; *Cheesem. Man. N.Z. Fl.* (1906) 23. R. trilobatus *T. Kirk in Trans. N.Z. Inst.* ix (1877) 547 (*not of Kit.*).

South Island: Canterbury—Sources of the Broken River, *T. F. C.* Otago—Swampy Hill, Port Molyneux, Catlin's River, *Petrie!* Makarewa, Winton, Centre Hill, *T. Kirk!* Lake Hauroko, *Crosby Smith;* Tapanui, *Cockayne.* Sea-level to 3500 ft. December–February.

34. **R. depressus** *T. Kirk in Trans. N.Z. Inst.* xii (1880) 393.—Small, depressed, rarely more than $1\frac{1}{2}$ in. high, more or less clothed with long straight hairs, usually forming matted patches. Rootstock short, often giving off short stolons, in large specimens sometimes branched at the top. Leaves numerous, all radical, on decurved petioles $\frac{1}{2}$–$1\frac{1}{2}$ in. long with broad sheathing bases; blade very variable in size and cutting, $\frac{1}{4}$–$\frac{3}{4}$ in. long, ovate in outline, usually trifoliolate with the leaflets ternately or pinnately cut into narrow-linear segments, sometimes less divided, 3-lobed with broader segments, or occasionally nearly entire. Scapes stout, much shorter than the leaves, 1-flowered. Sepals 5, ovate, membranous. Petals 5, oblong, slightly exceeding the sepals, with a gland just above the base. Carpels few, 4–8, hidden among the leaves, ovate, slightly turgid; style very minute.—*T. Kirk Students' Fl.* (1899) 17; *Cheesem. Man. N.Z. Fl.* (1906) 23.

Var. **glabratus** *T. Kirk Students' Fl.* (1899) 17.—Smaller and almost glabrous. Leaves minute, 3-lobed; lobes flat, acutely pointed. Achenes smaller.

South Island: Canterbury—Swamps in the Broken River basin, *J. D. Enys! T. Kirk! T. F. C.;* Tasman Valley, *T. F. C.;* Cass River, *Cockayne* and *Foweraker.* Altitudinal range from 2000 to 5000 ft. Var. *glabratus:* Mount Cardrona (Otago), alt. 4000 ft., *Petrie!*

I am indebted to Mr. Enys for an instructive series of specimens, all collected in one locality, showing passage-forms of leaves, from trilobate with entire lobes to trifoliolate with almost multifid leaflets. In Mr. Petrie's Mount Cardrona plant the leaves are trilobate, with the lobes entire or toothed, and the habit is somewhat different; but it is in young flower only, and more advanced specimens are required to prove its exact position with respect to the typical state.

35. **R. pachyrrhizus** *Hook. f. Handb. N.Z. Fl.* (1864) 8.—Small, stout, much depressed, forming dense patches seldom more than 1½ in. high, more or less clothed with long soft hairs. Rootstock stout, fleshy, creeping, branched; rootlets thick and stringy. Leaves crowded at the ends of the divisions of the rootstock, all radical, small, somewhat fleshy; petioles stout, flattened, ¼–½ in. long; blade ¼–¾ in. diam., cuneate or obovate-cuneate, with 3–5 acute or obtuse teeth or lobes. Scape short, stout, 1-flowered, ¼–1 in. high. Flowers ½–¾ in. diam. Sepals 5, silky, linear-oblong, membranous. Petals 8–15, linear-obovate, with 1 or sometimes 3 glands a little distance above the base. Receptacle hairy. Achenes forming a globose head ⅓ in. diam., turgid, rounded, glabrous or with a few long weak hairs; style stout, subulate.—*T. Kirk Students' Fl.* (1899) 19; *Cheesem. Man. N.Z. Fl.* (1906) 24.

South Island: Otago—Lake district, *Hector* and *Buchanan!* Garvie Mountains, *Poppelwell;* Old Man Range, Hector Mountains, Mount Pisa, Mount Cardrona, Mount Tyndall, *Petrie!* Altitudinal range 4000–7000 ft. January–March.

A singular little plant, of very peculiar habit and appearance. It is not allied to any other species of the creeping section of the genus, and would perhaps have been better placed in the vicinity of *R. sericophyllus.*

36. **R. macropus** *Hook. f. in Hook. Ic. Plant.* (1844) t. 634.—Perfectly glabrous, smooth and succulent. Stems long, fistulose, branched, creeping and rooting at the nodes, 1–2 ft. long. Radical leaves on slender petioles varying in length from 6–18 in.; blade 1–2½ in. diam., semicircular, flabellate or reniform in outline, 3–5-partite to the base; leaflets broad or narrow-obcuneate, more or less deeply and irregularly lobed and cut, lobes toothed at the tips. Flowering stem as long as or longer than the radical leaves, simple or branched, bearing 2–4 small cauline leaves, opposite to each of which springs a long or short 1-flowered peduncle. Flowers small, ½–¾ in. diam. Sepals 5, oblong, spreading. Petals 3–5, rarely more, longer or shorter than the sepals, narrow linear-oblong, obtuse, gland near the base. Achenes forming a small globose head, turgid, glabrous; style rather long, subulate.—*Fl. Nov. Zel.* i (1853) 10; *Handb. N.Z. Fl.* (1864) 7; *T. Kirk Students' Fl.* (1899) 17; *Cheesem. Man. N.Z. Fl.* (1906) 24. R. longipetiolatus *Col. in Trans. N.Z. Inst.* xxv (1893) 325.

North and South Islands: Ponds and marshes from the Kaipara River and Auckland Isthmus southwards to Otago. December–January.

A curious species, remarkable for the very long petioles of the radical leaves, an the weak flowering stems, which often scramble through sedges and other swam vegetation. It usually occurs in ponds or marshes that are covered with water during the winter and spring, but are laid bare in autumn.

37. **R. rivularis** *Banks and Sol. ex Forst. f. Prodr.* (1786) n. 524.—Smooth, perfectly glabrous in all its parts. Stems creeping, often branched and forming broad matted patches, rooting at the nodes and giving off tufts of radical leaves and erect peduncles or weak sparingly branched flowering stems, or floating and irregularly branched. Leaves on slender petioles

1–6 in. long; blade $\frac{1}{4}$–$1\frac{1}{2}$ in. diam., ovate semicircular or reniform in outline, usually 3–7-partite to the base; segments varying from cuneate to narrow-linear, more or less deeply cut at the apex, sometimes to the middle, occasionally ternatisect, rarely entire. Peduncles usually longer than the leaves. Flowers yellow, $\frac{1}{4}$–$\frac{3}{4}$ in. diam. Sepals 5, spreading. Petals 5–10, linear-oblong, usually longer than the sepals; gland some distance above the base. Achenes turgid, glabrous, sometimes rugose from the shrivelling of the epicarp; style rather long, subulate, straight or recurved.—*A. Cunn. Precur.* (1838) n. 630; *Raoul Choix* (1846) 47; *Hook. f. Fl. Nov. Zel.* i (1853) 11; *Handb. N.Z. Fl.* (1864) 8; *T. Kirk Students' Fl.* (1899) 18; *Cheesem. Man. N.Z. Fl.* (1906) 25.

Var. **major** *Benth. Fl. Austral.* i (1863) 14.—Suberect, 3–12 in. high. Leaves tufted; segments often very narrow and much cut.—R. incisus *Hook. f. Fl. Nov. Zel.* i (1853) 10, t. 4. R. amphitricha *Colenso in Trans. N.Z. Inst.* xvii (1885) 237.

Var. **subfluitans** *Benth. l.c.*—Creeping or partially floating. Leaves smaller, less divided. Flowers and achenes smaller.—R. inundatus *R. Br. ex DC. Syst.* i (1818) 269; *Hook. f. Fl. Tasm.* i (1860) 8.

Var. **inconspicuus** *Benth. l.c.*—Smaller, more slender, suberect. Leaf-segments 3-fid. Flowers smaller.—R. inconspicuus *Hook. f. Fl. Tasm.* i (1860) 8, t. 2B.

var. flaccidus Cock. Hall, Sc. 23. 1925.

North, South, Stewart, and Chatham Islands: Common in wet swamps, lakes, and rivers throughout, ascending to 3000 ft. October to March. Also plentiful in Australia and Tasmania.

A most abundant little plant, exceedingly variable in most of its characters, and particularly so in the extent to which the leaves are divided, and the width or narrowness of the ultimate segments. Stockowners consider it to be highly poisonous, and attribute to it many deaths occurring among cattle feeding in swamps in dry summers.

38. **R. acaulis** *Banks and Sol. ex DC. Syst.* i (1818) 270.—Small, dark-green, fleshy, perfectly glabrous, sending out creeping stolons and often forming broad matted patches. Leaves all radical, on slender petioles 1–3 in. long; blade $\frac{1}{2}$–$\frac{3}{4}$ in. diam., trifoliolate or deeply 3-lobed; leaflets or segments sessile, obovate or oblong, obtuse, entire or 2–3-lobed. Scapes shorter than the leaves, naked, 1-flowered. Flowers small, $\frac{1}{4}$–$\frac{1}{3}$ in. diam. Sepals 5, roundish-ovate, membranous. Petals 5–8, spathulate, with a single gland near the middle. Achenes forming a small rounded head $\frac{1}{3}$ in. diam., turgid, glabrous; style short, subulate, straight or nearly so.—*A. Cunn. Precur.* (1838) n. 631; *Raoul Choix* (1846) 47; *Hook. f. Fl. Antarct.* i (1844) 4, t. 2; *Fl. Nov. Zel.* i (1853) 11; *Handb. N.Z. Fl.* (1864) 8; *A. Gray Bot. U.S. Expl. Exped.* (1854) 7; *T. Kirk Students' Fl.* (1899) 18. R. stenopetalus *Hook. Ic. Plant.* (1844) t. 677. T. 72.1.22

North, South, and Stewart Islands: Sandy beaches and muddy shores, not uncommon. Auckland Islands: *Hooker*, &c. Chatham Islands: *Buchanan*. Only known inland on the shores of Lakes Rotorua, Tarawera, and Taupo. September–November. Also found in southern Chile.

A distinct little species, easily recognized by its creeping and matted habit, trifoliolate leaves with nearly entire leaflets, short scapes, and spathulate petals. Mr. Colenso's herbarium contains no specimens of his *R. uniflorus* (Trans. N.Z. Inst. xxxi (1896) 267). The description agrees with *R. acaulis* in most points, but the plant is said not to be stoloniferous, and to possess a sheathing bract on the upper part of the scape.

39. **R. biternatus** *Smith in Rees Cyclop.* xxix (1802) n. 48.—Smooth, glabrous, succulent, stems creeping and rooting at the nodes. Leaves on petioles 1–4 in. long; blade cordate-reniform in outline, $\frac{1}{3}$–1 in. diam. or more, 3-lobed or 3-partite; segments variable in shape, broad or narrow,

Ex Herb. H. Wards. 1915. 13 it.

cuneate at the base, deeply and irregularly toothed. Peduncles axillary, stout, erect, shorter than the leaves. Flowers small, ¼–⅓ in. diam. Sepals 4–5, ovate, obtuse, membranous. Petals the same number, slightly longer than the sepals, obovate-spathulate, with a gland a little below the middle. Achenes forming a rounded head ⅓ in. diam., broadly ovate, turgid; style short, straight.—*Schenk in Pflanzengeographie der Subantarklischen Insel* (1905) 26; *Wildeman Voy. "Belgica"* (1905) 26; *Cheesem. Subantarct. Is. of N.Z.* ii (1909) 398. R. crassipes *Hook. f. Fl. Antarct.* ii (1847) 224, t. 81, and *Phil. Trans. Roy. Soc.* 168 (1879) 17; *T. Kirk Students' Fl.* (1899) 17; *Cheesem. Man. N.Z. Fl.* (1906) 26. D.C. Lindr. 1·30.

Macquarie Island: Swampy places in the lower part of the island, *Dr. Scott, A. Hamilton! H. Hamilton!*

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40. **R. Limosella** *F. Muell. ex Kirk in Trans. N.Z. Inst.* iii (1871) 177.—Small, slender, perfectly glabrous. Stems filiform, creeping and rooting at the nodes, often forming matted patches. Leaves solitary or in tufts of 2–3 at the nodes, ½–3 in. long, very narrow-linear, usually dilated at the tip and subspathulate, obtuse, nerveless. Peduncles filiform, axillary, solitary, much shorter than the leaves. Flowers minute, ⅕ in. diam. Sepals 4, rounded-ovate, membranous. Petals 4, much longer than the sepals, narrow-linear, revolute at the tip; gland some little distance above the base. Achenes 8–12, rounded, somewhat turgid; style long, slender, recurved.—*T. Kirk Students' Fl.* (1899) 19; *Cheesem. Man. N.Z. Fl.* (1906) 26. R. limoselloides *F. Muell. ex Hook. f. Ic. Plant.* (1867–71) t. 1081 (*not of Turc.*). T. 75: 188. 1945.

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41. **R. sessiliflorus** *R. Br. ex DC. Syst.* i (1818) 302.—A small slender hairy annual, with sparingly branched suberect or decumbent stems 2–5 in. long. Leaves small, radical and cauline, on slender petioles ¾–1½ in. long; lobed, inches s 4–5, argins at the parvi- *Iandb.*

Ranunculus sessiliflorus, RBr.
not native to N.Z. see T.N.Z.I.
vol. 57, p. 67. (Ckn. & Allan).

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Ac. Sheffield. Fl. Wimbs. 18. Bot. 1915.

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North Island: Shaded places on lava-streams, Auckland Isthmus, Mount Wellington and Mount Eden, &c., once very plentiful, but now becoming rare. Originally discovered by Mr. Colenso. Tiritiri Island, *A. Hansen!* September–November.

A common Australian plant, and possibly introduced from thence in the very early days of the Dominion. It is very closely allied to the northern *R. parviflorus*, which is now copiously naturalized in cultivated fields and waste places throughout the Dominion. But *R. sessiliflorus* is a much smaller and more delicate plant, with thinner and less hairy leaves, and the flowers and fruit are much smaller.

4. **CALTHA** Linn. 1735.

Glabrous tufted perennial herbs; rootstock creeping. Leaves all or chiefly radical, oblong, ovate or rounded, cordate at the base or 2-lobed with the lobes turned upwards. Scape 1- or few-flowered. Sepals 5 or more, petaloid, usually deciduous. Petals wanting. Stamens numerous. Carpels several, sessile; ovules several or many, attached in 2 series to the ventral suture. Follicles 6 or more in a head, spreading, several- or many-seeded, opening along the inner face. T.N.Z.I. 51:85.

A small genus of 15–18 species, found in the temperate regions of both hemispheres. The southern species belong to the section *Psychrophila*, distinguished by the turned-up basal lobes or auricles of the leaves. Both the New Zealand species are endemic, although allied to the Australian and Tasmanian *C. introloba* and *C. phyllopoda*.

Leaves entire or sinuate. Flowers yellow. Sepals linear-subulate, tapering from the base into almost caudate points .. 1. *C. novae-zealandiae.*

Leaves dentate. Flowers white. Sepals oblong, obtuse or subacute, broadest above the middle .. .. .. 2. *C. obtusa.*

Mr. A. W. Hill's "Genus *Caltha* in the Southern Hemisphere" (*Annals of Botany*, July, 1918) gives an excellent account of the structure and morphology of the curious upturned lobes of the leaves of the southern species of the genus, and should be consulted by all workers in the genus. Text-figures are given of the leaves of the 4 Australian and New Zealand species.

1. **C. novae-zelandiae** *Hook. f. Fl. Nov. Zel.* i (1853) 12, t. 6.—A perfectly glabrous perennial 1–6 in. high. Rootstock stout, with fleshy rootlets. Leaves all radical, spreading; petiole variable in length, $\frac{1}{2}$–4 in., grooved, base dilated, membranous, sheathing the stem; lamina $\frac{1}{3}$–1 in. long, ovate-oblong, entire or faintly sinuate, notched at the apex, deeply 2-lobed at the base, the lobes turned upwards, and almost appressed to the surface of the leaf, reaching nearly half-way up it. Scape solitary, naked, 1-flowered, $\frac{1}{2}$–5 in. long, short at first, but lengthening as the fruit ripens. Flowers pale-yellow, sweet-scented, $\frac{1}{2}$–1 in. diam. Sepals 5–7, narrow, linear-subulate, tapering from the base into an almost caudate point, 3-nerved. Stamens 15–20. Carpels 6–12, ovate, narrowed into a short stout style; seeds few, 2–5.—*Handb. N.Z. Fl.* (1864) 9; *T. Kirk Students' Fl.* (1899) 21; *Cheesem. Man. N.Z. Fl.* (1906) 28. C. marginata *Col. in Trans. N.Z. Inst.* xxiii (1891) 382.

North Island: Kaimanawa Mountains, *B. C. Aston!* Ruahine Mountains, *Colenso* and many others; Tararua Mountains, *Buchanan, W. Townson!* Mount Hector, *Petrie.* South Island, Stewart Island: Abundant on the mountains from Cook Strait southwards. Altitudinal range from 2500 to 6000 ft., but descends to sea-level in Stewart Island.

Closely allied to the Australian *C. introloba*, but the upturned lobules of the leaves are longer and narrower in that plant, and the flowers are said to be white.

Cheesem. Fl. Nist. 1930: 516. C. introloba F.v.M. var. obtusa (Cheesem.) Cheesem.

2. **C. obtusa** *Cheesem. in Trans. N.Z. Inst* xxxiii (1901) 312.—Smaller than *C. novae-zelandiae*, seldom more than 2 in. high. Leaves smaller, broadly oblong or almost rounded, coarsely crenate or dentate, notched at the apex, 2-lobed at the base, lobes turned upwards and appressed to the surface, almost as large as the blade, coarsely crenate. Flowers white, ½ in. diam., at first sessile among the uppermost leaves, but the scape elongates in fruit. Sepals 5, oblong, obtuse or subacute, broadest above the middle. Stamens 10–15, carpels 5–8, narrow-ovate; style long, slender. Ripe fruit not seen.

North Island: *Herb. Colenso!* (probably from the Ruahine Mountains, but without locality or collector's name). South Island: Mountains from the head of the Broken River, Canterbury, 5000–6000 ft., *T. F. C.* Otago—Black Peak, 6000 ft., *Buchanan!* Mount St. Bathan's and Dunstan Mountains, *Petrie!* Cuthbert Peak, *Crosby Smith.*

The white flowers, blunt oblong sepals, and the unusually large upturned basal lobes of the leaves are conspicuous characters of this curious and distinct species.

Wintereaceae. See Dandy, J. Bot. May 1933. 119. see also Hutch., Kew Bull. 1921: 190

Family XLI. MAGNOLIACEAE.

Trees or shrubs, often aromatic. Leaves alternate, entire or toothed, stipulate or exstipulate. Flowers axillary or terminal, solitary or fascicled, often large. Sepals 3, seldom more, deciduous. Petals 3–6, in several rows, hypogynous, imbricate in the bud. Stamens indefinite, hypogynous; anthers adnate. Carpels either many and imbricated on an elongated receptacle, or few in a single whorl on a flat receptacle, always 1-celled. Ovules 2 or several, attached to the ventral suture. Ripe carpels either dry and follicular, or succulent and berried, rarely woody. Seeds solitary or several; embryo minute, at the base of copious albumen.

D'Urv. TNZI. 56 (1926) 3

A small family, mainly found in eastern and tropical Asia and North America. Genera 10, species under 80. Some of the species of *Magnolia* are strikingly beautiful in both flowers and foliage, and the tulip-tree (*Liriodendron tulipifera*) is one of the handsomest timber-trees known. The sole New Zealand genus is a somewhat anomalous member of the family, belonging to the tribe *Wintereae*, characterized by the exstipulate leaves, polygamous flowers, and the carpels few in number in a single whorl.

Pseudowintera.

DRIMYS Forst.

Glabrous and aromatic trees and shrubs, usually of small size. Leaves alternate, exstipulate, marked with pellucid dots. Flowers small. Calyx cupuliform in the New Zealand species, the margin shortly and irregularly toothed or lobed, or entire. Petals 5 or 6 or more, in 2 or more whorls, spreading. Stamens with the filaments thickened above; anther-cells diverging. Carpels 1 to several; ovules few or many. Fruit of one or several indehiscent berries.

A small genus of 10 or 12 species, found in South America, New Zealand, Australia, New Caledonia, New Guinea, and Borneo. The three New Zealand species are all endemic.

Large shrub or small tree. Bark black. Leaves 2–5 in., not blotched. Fascicles 3–10-flowered .. .. 1. *D. axillaris.*

Large shrub or small tree. Bark black. Leaves 1½–2½ in., blotched with red. Fascicles 2–4-flowered .. .. 2. *D. colorata.*

Small compact shrub, 3–5 ft. high. Bark reddish-yellow, rugose. Leaves ½–1 in.; petioles appressed. Flowers solitary or two together .. .. 3. *D. Traversii.*

1. **D. axillaris** (*Forst.*) *Char. Gen.* (1776) t. 42.—A small tree 12–25 ft. in height, rarely more; bark black. Leaves 2–5 in. long, on short petioles, elliptic-ovate or elliptic-oblong, obtuse, coriaceous or rarely submembranous, green on both surfaces or glaucous below, not blotched. Flowers small, greenish-yellow, in fascicles of 3–10 in the axils of the leaves, or from the scars of fallen leaves; pedicels $\frac{1}{4}$–$\frac{3}{4}$ in. long. Calyx cupular, with 2–6 irregular shallow lobes or notches. Petals 5–6, linear, spreading. Stamens 6–15, in 3 series. Carpels 3–5. Berries 2 or 3, about the size of a peppercorn; seeds 3–6, black, angular.—*A. Rich. Fl. Nouv. Zel.* (1832) 290; *A. Cunn. Precur.* (1839) n. 629; *Raoul Choix* (1846) 47; *Hook. f. Fl. Nov. Zel.* i (1853) 12; *Handb. N.Z. Fl.* (1864) 10; *T. Kirk Forest Fl.* (1889) t. 1; *Students' Fl.* (1899) 22; *Cheesem. Man. N.Z. Fl.* (1906) 29. Wintera axillaris *Forst. f. Prodr.* (1786) n. 229.

North and South Islands: Not uncommon in forests from Ahipara to Banks Peninsula. Altitudinal range from sea-level to 3500 ft. *Horopito.* October–December.

Aromatic and pungent, but not so much so as the following species. The wood is serviceable for inlaying, and a decoction of the bark is occasionally used by country settlers as an astringent.

2. **D. colorata** (*Raoul*) *Choix* (1846) t. 23.—Very similar to the preceding, and merged with it by Hooker in the Handbook. It is usually smaller and more compactly branched; and the leaves are shorter, $\frac{1}{2}$–$2\frac{1}{2}$ in. long, more coriaceous, yellowish-green blotched with red, usually more glaucous below. Fascicles 2–4-flowered; peduncles much shorter. Calyx shallowly cup-shaped, often quite entire. Carpels 2–4, but it is seldom that more than 2 ripen. Seeds 2–3.—*Cheesem. Man. N.Z. Fl.* (1906) 30. D. axillaris *var.* colorata *T. Kirk Forest Fl.* (1889) t. 2; *Students' Fl.* (1899) 22.

North, South, and Stewart Islands: Not uncommon from the Patetere Plateau and Rotorua southwards. Very abundant in Stewart Island, where it descends to sea-level. Ascends to 4000 ft. November–January.

Undoubtedly very close to *D. axillaris*, and in the dried state not easily separated from it. But in the field it is readily distinguished, and all my correspondents regard it as distinct. The two species grow intermixed in many localities in the Wellington and Nelson Districts.

3. **D. Traversii** *T. Kirk in Trans. N.Z. Inst.* xxx (1898) 379.—A compact closely branched shrub 3–6 ft. high. Branches stout; bark reddish or reddish-yellow, rough and wrinkled, almost verrucose, sometimes viscid. Leaves numerous, close-set and often overlapping, $\frac{3}{4}$–1 in. long, oblong-obovate or obovate-spathulate, obtuse, thick and coriaceous, glaucous below, margins slightly thickened; petiole short, stout, appressed. Flowers small, axillary, 1 or 2 together; pedicels short. Calyx saucer-shaped, entire. Petals 5, linear-oblong, obtuse. Stamens usually 5. Carpel solitary (always ?), obovate. Berry small, globose-depressed; seeds 3–6.—*Cheesem. Man. N.Z. Fl.* (1906) 30; *Ill. N.Z. Fl.* i (1914) t. 8.

South Island: Western part of the Nelson Province; near Collingwood, *H. H. Travers!* Medora Creek, Wakamarama Range to the Gouland Downs, alt. 2000–3000 ft., *J. Dall!* Mount Rochfort, near Westport, *W. Townson!*

A very curious and distinct species, by far the smallest of the genus.

Family XLII. **MONIMIACEAE.**

Trees or shrubs, often aromatic. Leaves opposite, rarely alternate, simple; stipules wanting. Flowers regular, hermaphrodite or unisexual, usually in short cymes or racemes. Perianth inferior, globose, hemispherical or subcampanulate, limb 4–15-toothed. Stamens usually indefinite, in one or many series on a disc lining the perianth-tube, all fertile or some reduced to staminodia; filaments short; anthers 2-celled, opening by slits or valves. Carpels usually many, rarely solitary, free, sessile on the base or sides of the perianth-tube, 1-celled; style long or short; stigma small; ovule solitary, erect or pendulous. Fruit of several (rarely only one) drupes or achenes, resting on the expanded receptacle or enclosed within the enlarged perianth. Seed solitary, testa membranous; albumen fleshy; embryo variable, radicle inferior or superior.

A small family, best represented in the southern tropics, and largely added to of late years in the oceanic islands of the Pacific; also well distributed in Madagascar and South America. Genera about 30; species probably over 250. Of the 2 New Zealand genera, *Hedycarya* is found in Australia and the Pacific islands, while *Laurelia* is confined to South America and New Zealand.

Anthers opening by longitudinal slits. Ovule pendulous. Drupes stipitate	1. HEDYCARYA.
Anthers opening by ascending valves. Ovule erect. Achenes with plumose styles	2. LAURELIA.

1. **HEDYCARYA** Forst. 1776.

Small trees or shrubs. Leaves opposite, entire or toothed. Flowers dioecious, in axillary cymes or racemes. Male flowers: Perianth broad, cup-shaped; segments 5–10, inflexed, more or less connate at the base. Stamens numerous, covering almost the whole of the disc; filaments very short or almost wanting; anthers 2-celled, dehiscing by introrse or lateral slits. Female flowers: Perianth similar to that of the males, but rather smaller. Staminodia wanting. Carpels numerous, covering the whole disc, sessile, terminated by a thick conical style; ovule pendulous, anatropous. Fruit of few or several drupes crowded on the top of the disc-shaped receptacle. Seed pendulous; albumen copious; embryo axile, radicle superior.

A genus of 8 or 10 species, one of which is endemic in New Zealand, and another in Australia, the remainder being natives of New Caledonia, Fiji, Samoa, and Tonga.

1. **H. arborea** *Forst. Char. Gen.* (1776) 128, t. 64.—A small tree 20–40 ft. high with a trunk 9–20 in. diam. or more; bark dark-brown; branches ascending, pubescent at the tips. Leaves opposite, petiolate, 2–5 in. long including the petiole, linear-oblong to obovate-oblong or obovate, acute or obtuse, distantly coarsely serrate or rarely entire, coriaceous, dark-green above, paler beneath, glabrous or more or less pubescent, especially on the petiole and midrib beneath. Racemes axillary, often corymbosely branched, shorter than the leaves; pedicels variable in length, pubescent. Male perianth $\frac{1}{3}$–$\frac{1}{2}$ in. diam., saucer-shaped, pubescent. Stamens very numerous; anthers sessile, pubescent along the back. Female perianth $\frac{1}{4}$ in. across. Carpels 8–20. Drupes 4–10, crowded, stipitate, $\frac{1}{2}$ in. long, oblong, obtuse, bright-red, succulent; endocarp hard, crustaceous.—*Cheesem. Man. N.Z. Fl.* (1906) 599; *Ill. N.Z. Fl.* i (1914) t. 167. H. dentata *Forst. f. Prodr.* (1786) n. 379; *A. Rich. Fl. Nouv. Zel.* (1832) 354; *A. Cunn. Precur.* (1838)

N 78. Murray Syst. Veg. p. 894.

n. 336; *Raoul Choix* (1846) 30, t. 20; *Hook. f. Fl. Nov. Zel.* i (1853) 219; *Handb. N.Z. Fl.* (1864) 240; *T. Kirk Forest Fl.* (1889) t. 110. H. scabra *A. Cunn. Precur.* (1838) n. 337. Zanthoxylum novae-zelandiae *A. Rich. Fl. Nouv. Zel.* (1832) 291, t. 33.

North and South Islands: Abundant in woods from the Three Kings Islands and the North Cape to Banks Peninsula and Milford Sound. Sea-level to 2500 ft. *Porokaiwhiri.* October–November.

2. **LAURELIA** Juss.

Tall aromatic forest-trees. Leaves opposite, coriaceous. Flowers dioecious or polygamous, in axillary cymes or racemes. Male flowers: Perianth-tube short, campanulate; lobes 5–12, in 2 or 3 series, subequal or the outer shorter. Stamens 6–12; filaments short, 2-glandular at the base; anthers 2-celled, opening by 2 upturned valves. Female flowers (or hermaphrodite): Perianth elongating after fertilization, narrow-urceolate or tubular, ultimately 3–5-cleft. Stamens reduced to scales, or the outer series alone perfect. Carpels numerous, fusiform, pilose, narrowed into long plumose styles; ovule solitary, erect, anatropous. Achenes small, densely pilose, included in the enlarged perianth. Seed albuminous; embryo small, radicle inferior.

Besides the New Zealand species, which is endemic, there is a second found in Chile. The genus is very closely allied to the Australian *Atherosperma*, which principally differs in the flowers being seated within 2 cymbiform bracts.

1. **L. novae-zealandiae** *A. Cunn. Precur.* (1838) n. 354.—A tall forest-tree, often attaining a height of 80 to 100 or even 120 ft.; trunk 4–6 ft. diam., usually with radiating buttresses at the base; bark pale, almost white; branchlets opposite, tetragonous, the younger ones faintly pubescent. Leaves opposite, petiolate, 1½–3 in. long, oblong or elliptic-oblong or obovate, obtuse, cuneate at the base, coarsely and bluntly serrate, coriaceous, dark-green and glossy above, paler beneath, glabrous or silky-pubescent when young. Flowers small, ⅕–¼ in. diam., polygamo-dioecious, in axillary racemes ½–1 in. long; pedicels silky, as is the perianth externally. Male perianth shallow, 5–6-partite almost to the base; stamens about 12. Female (or hermaphrodite) perianth with a swollen tube contracted above; segments of the limb short, spreading. Stamens either all reduced to erect scales, or some or all of the outer row perfect. Carpels numerous; styles long, silky. Fruiting-perianth much enlarged and elongated, often quite 1 in. long, narrow-urceolate, splitting irregularly into 3–5 valves. Achenes 6–12, narrowed into long plumose styles.—*Raoul Choix* (1846) 42; *Hook. f. Fl. Nov. Zel.* i (1853) 218; *T. Kirk Forest Fl.* (1889) t. 71; *Cheesem. Man. N.Z. Fl.* (1906) 600. Atherosperma novae-zelandiae *Hook. f. Handb. N.Z. Fl.* (1864) 240.

North Island: Abundant in swampy forests. South Island: Various localities in Marlborough, Nelson, and Westland, rare and local. Sea-level to 2000 ft. *Puka-tea.* October–November.

The wood is pale-brown, often prettily clouded with darker brown. It is strong and tough, and does not readily split, so that it is occasionally used for boatbuilding, and more rarely for cabinetwork. The leaves and young branches are aromatic when bruised.

Family XLIII. **LAURACEAE.**

Trees or shrubs, often aromatic. (*Cassytha* is a leafless parasitic climber.) Leaves alternate, rarely opposite, usually simple and entire, often gland-dotted; stipules wanting. Flowers regular, hermaphrodite or unisexual, generally small, usually in axillary cymes or panicles or clusters. Perianth inferior, herbaceous or coloured, deeply cut into 4–8 (usually 6) imbricate segments. Stamens usually twice the number of the perianth-segments, inserted in 2–3 series on the perianth-tube, all fertile or some reduced to staminodia; filaments flattened, naked or provided with 2 glands at the base; anther-cells 2–4, opening by upturned valves. Ovary free, 1-celled; style simple, terminal; stigma capitate, entire or lobed; ovule solitary, pendulous, anatropous. Fruit a drupe or berry, rarely dry, free or enclosed in the perianth. Seed solitary, pendulous; albumen wanting; embryo with large plano-convex cotyledons, radicle minute, superior.

An important family, having its headquarters in tropical America and Asia, less common in tropical Africa or in Australia and the Pacific islands, while few species penetrate into either the North or South Temperate Zones. Genera over 40; species approaching 1000. The family includes many useful plants, the chief of which are the camphor laurel, cinnamon, alligator-pear, sassafras, &c. The timber of not a few species is highly valued on account of its toughness and fine and solid grain. The three New Zealand genera are all widely diffused in tropical regions.

Trees. Flowers hermaphrodite, panicled. Three inner anthers extrorse . . . . . 1. BEILSCHMIEDIA.
Trees. Flowers dioecious, umbellate; umbels involucrate. Anthers all introrse . . . . . 2. LITSAEA.
Leafless parasitic twining herbs . . . . . 3. CASSYTHA.

1. **BEILSCHMIEDIA** Nees.

Trees or shrubs. Leaves alternate or opposite, penninerved. Flowers small, hermaphrodite, panicled or fascicled. Perianth-tube short; limb with 6 subequal segments. Perfect stamens 9 in 3 series; the 2 outer series with introrse anthers and eglandular filaments; the third series with extrorse anthers and filaments 2-glandular at the base; an inner fourth series of 3 staminodia present. Ovary not immersed in the perianth-tube, the perianth ultimately wholly deciduous. Fruit an oblong or ovoid or globose berry.

A small genus, comprising about 40 species, scattered through tropical Asia and Africa, Australia, New Zealand, and tropical America. The two species found in New Zealand are endemic. Hooker's genus *Nesodaphne*, which was formed for their reception, is now merged with *Beilschmiedia*.

Branches stout, clothed with red-brown tomentum. Leaves obovate . . . . . 1. *B. Tarairi*.
Branches slender, glabrous or nearly so. Leaves lanceolate . . 2. *B. Tawa*.

(A. Cunn.)

1. **B. Tarairi** *Benth. and Hook. f. ex T. Kirk Forest Fl.* (1889) t. 43.—A tall evergreen tree 50–70 ft. high, with a straight erect trunk $1\frac{1}{2}$–3 ft. diam.; bark dark-brown, smooth and even; young branches, petioles, veins of the leaves beneath, upper surface of young leaves, and branches of the inflorescence densely clothed with red-brown velvety tomentum. Leaves alternate, petiolate, 3–6 in. long, obovate-oblong or broadly oblong, obtuse, quite entire, coriaceous, glabrous above when mature with impressed veins, glaucous and finely pubescent beneath with prominent veins; petioles

about ½ in. long. Panicles axillary, shorter than the leaves, 1½–2½ in. long; branches spreading. Flowers small, ⅙ in. diam.; pedicels short; bracts linear, obtuse, caducous. Berry 1–1½ in. long, ovoid, dark-purple.—*Cheesem. Man. N.Z. Fl.* (1906) 602; *Ill. N.Z. Fl.* i (1914) t. 68. Nesodaphne Tarairi *Hook. f. Fl. Nov. Zel.* i (1853) 217; *Handb. N.Z. Fl.* (1864) 238. Laurus Tarairi *A. Cunn. Precur.* (1838) n. 351; *Raoul Choix* (1846) 42.

North Island: In forests from the North Cape to the East Cape and Raglan, but local to the south of Auckland. Sea-level to 1200 ft. *Tarairi.* October–December.

One of the handsomest trees in the Dominion, and one of the most distinct in general appearance. The wood is light, close-grained, and easily worked, but is said to be wanting in strength and durability. As it forms a large proportion of the forests north of Auckland, inquiries should be made respecting its real value as a timber-tree.

2. **B. Tawa** *Hook. f. and Benth. ex T. Kirk Forest Fl.* (1889) t. 126.—A tall forest-tree 40–80 ft. high, with a trunk 1–4 ft. in diam.; bark thin, smooth, dark brownish-black; branches slender, silky when young. Leaves alternate, petiolate, 2–4 in. long, usually lanceolate, but often broader and oblong-lanceolate or elliptic-oblong, acute, quite entire, very finely reticulate on both surfaces, often glaucous beneath; petioles ¼–½ in. long. Panicles slender, glabrous, 1½–3 in. long; branches lax, elongate. Flowers minute, hardly ⅛ in. diam. Berry rather smaller than in the preceding species, about 1 in. long, ovoid, dark-purple.—*Cheesem. Man. N.Z. Fl.* (1906) 602. Nesodaphne Tawa *Hook. f. Fl. Nov. Zel.* i (1853) 217; *Handb. N.Z. Fl.* (1864) 239. Laurus Tawa *A. Cunn. Precur.* (1838) n. 352; *Raoul Choix* (1846) 42. L. Victoriana *Col. ex Hook. f. Handb. N.Z. Fl.* (1864) 239.

North Island: Abundant in forests throughout. South Island: Nelson and Marlborough—In various localities on the shores of Cook Strait. Sea-level to 2500 ft. *Tawa.* November–December.

A well-known tree, in many portions of the North Island constituting the largest portion of the forest. The wood is white, straight in the grain, easily worked, and is largely used for buckets, tubs, casks, &c. The plum-like fruit was formerly collected by the Maoris for food, the pulpy portion being eaten in the raw state, and the kernel after prolonged steaming.

2. **LITSAEA** Lam.

Trees or shrubs. Leaves alternate or rarely opposite, penninerved or triplinerved; leaf-buds naked or scaly. Flowers dioecious, in 4–6- or rarely many-flowered umbels; umbels axillary or fascicled or racemose, each one enclosed before the expansion of the flowers within a globose involucre; involucral scales 4–6, broad, concave. Perianth-tube ovoid or campanulate or scarcely conspicuous; limb with 4–6 segments, rarely more or fewer. Male flowers: Stamens usually 9–12; the filaments of the inner row or all glandular at the base; anthers all introrse, 4-celled. Ovary rudimentary. Female flowers: Staminodia present. Ovary oblong or ovoid, narrowed into the style; stigma usually dilated and irregularly lobed. Fruit a more or less succulent berry, seated on the usually enlarged perianth-tube.

Species about 150, most abundant in tropical and eastern Asia, the Malayan and Pacific islands, and Australia, rare in Africa and America. The single species found in New Zealand is endemic therein.

1. **L. calicaris** *Benth. and Hook. f. ex T. Kirk Forest Fl.* (1889) t. 10.—A perfectly glabrous closely branched leafy tree 30–40 ft. high, with a trunk 1½–2½ ft. diam.; bark dark greyish-brown. Leaves alternate, petiolate, 2–5 in. long, ovate or ovate-oblong, obtuse or narrowed into an obtuse point, quite entire, firm but hardly coriaceous, often glaucous beneath; petioles ½–1 in. long. Flowers often very abundantly produced, in 4–5-flowered involucrate umbels arranged in short axillary racemes. Involucral leaves usually 4. Pedicels short, silky. Perianth-segments 5–8, oblong or ovate, obtuse. Stamens about 12; filaments slender, all with 2 stipitate glands near the base. Female flowers rather smaller and less numerous than the males. Staminodia flattened, each 2-glandular near the base. Ovary ovoid; stigma dilated, irregularly 3-lobed. Berry oblong-ovoid, ¾ in. long, reddish, seated in a flat cup-shaped disc composed of the enlarged perianth-tube.—*Cheesem. Man. N.Z. Fl.* (1906) 608; *Ill. N.Z. Fl.* ii (1914) t. 169. Tetranthera calicaris *Hook. f. Fl. Nov. Zel.* i (1853) 216; *Handb. N.Z. Fl.* (1864) 238. T. Tangao *R. Cunn. ex A. Cunn. Precur.* (1838) n. 353. Laurus calicaris *Soland. ex A. Cunn. Precur.* (1838) n. 353; *Raoul Choix* (1846) 42.

North Island: Not uncommon in forests from the North Cape southwards to Rotorua and the East Cape. Sea-level to 2000 ft. *Mangeao; Tangeao.* September–October.

Wood strong, tough, and elastic, suitable for all classes of coopers' or wheelwrights' work, for ships' blocks, &c.

3. CASSYTHA Linn. 1753.

Leafless twining parasites, attaching themselves to living shrubs or trees by means of small suckers; stems terete, wiry or filiform. Leaves replaced by minute scales. Flowers small, hermaphrodite, in spikes or heads or racemes, each flower 3-bracteolate. Perianth-tube turbinate or ovoid; segments of the limb 6, the 3 outer much smaller. Perfect stamens usually 9 in 3 series; the two outer series either all perfect or rarely the second series reduced to staminodia; anthers introrse; filaments eglandular; the third series all perfect with extrorse anthers, the filaments 2-glandular at the base; an inner fourth series of 3 staminodia present. Ovary almost free from the perianth at the time of flowering; stigma small. Fruit altogether enclosed in the enlarged and succulent perianth-tube, crowned by the persistent limb. Seed with a membranous testa. Embryo with thick fleshy cotyledons, which are distinct in the young state, but confluent when mature.

A very remarkable genus of parasitic plants with the habit of *Cuscuta*. Species about 15, 1 of which is very widely distributed, 1 or 2 are found in South Africa, and 1 in Borneo; the remainder are all Australian, 1 of them being the same as the New Zealand species.

1. **C. paniculata** *R. Br. Prodr.* (1810) 404.—Stems pale yellow-green, much branched, several feet in length, covering small shrubs with dense interwoven masses; branches $\frac{1}{10}$ in. diam., glabrous or minutely silky at the very tips; scales minute, ovate or ovate-lanceolate, membranous. Spikes numerous, often branched, ½–2 in. long. Flowers minute, distant, sessile, about $\frac{1}{10}$ in. diam. Perianth glabrous; the 3 outer segments very small; the inner obtuse. Stamens 9, all perfect. Ovary glabrous. Fruit globose, about the size of a pea, enclosed in the enlarged and

succulent perianth-tube, obscurely 6-ribbed or quite smooth.—*Hook. f. Fl. Nov. Zel.* i (1853) 218; *Handb. N.Z. Fl.* (1864) 239; *Benth. Fl. Austral.* v (1870) 311.

North Island: Extreme northern peninsula, from the North Cape to Ahipara and Mangonui, abundant. December–March.

Family XLIV. **CRUCIFERAE.**

Herbs, very rarely undershrubs, with pungent watery juice. Leaves alternate, entire, lobed or pinnately divided, the lower ones often forming a rosette at the base of the stem; stipules wanting. Flowers perfect, in terminal racemes, which are often short and corymb-like when the flowering commences, but lengthen out as it advances, usually without bracts. Sepals 4, free, deciduous. Petals 4, free, hypogynous, placed crosswise. Stamens 6, 2 of them shorter than the other 4; sometimes reduced to 4 or even 2 (*Lepidium*). Ovary usually 2-celled; style short or wanting; stigma entire or 2-lobed. Ovules few or numerous. Fruit a pod, long or short, usually divided into 2 cells by a thin partition called the replum, from which the 2 valves fall away at maturity; more rarely the pod is indehiscent or transversely jointed. Seeds without albumen, entirely filled by the large embryo, which is variously bent or folded, the radicle either lying along the edges of the cotyledons (accumbent) or placed along the back of one of them (incumbent).

The Crucifers form a large and extremely natural family, comprising about 220 genera and between 1700 and 2000 species. The species are distributed over the whole world, but are most plentiful in the temperate regions of the Northern Hemisphere, and especially so in southern Europe and Asia Minor. They are rare in the tropics, particularly where there are no mountain-ranges. Most of them possess antiscorbutic and stimulating properties, and many are staple articles of food. Not a few of the cultivated species (and others) have become naturalized in New Zealand, as will be seen from the list of introduced plants appended to this work. Of the New Zealand genera, *Pachycladon* and *Notothlaspi* are endemic; the remainder are widely spread outside the Dominion.

* Pods long and narrow.

Pods terete, linear-oblong, tumid. Seeds in two rows in each cell. Cotyledons accumbent .. .. 1. Nasturtium.

Pods flat, linear, acute; valves opening elastically from the base. Seeds in one row. Cotyledons accumbent .. .. .. 2. Cardamine.

Pods terete or obtusely 4–6-angled, 1–3-nerved. Seeds in one row. Cotyledons incumbent .. .. 3. Sisymbrium.

** Pods short and broad.

Alpine herb with stellate pubescence. Pods compressed, boat-shaped, not winged. Seeds 3–5 in each cell.. .. .. 4. Pachycladon.

Pods compressed, oblong to obcordate, valves turgid, keeled. Seeds numerous .. .. 5. Capsella.

Pods much compressed, ovate to orbicular, often winged. Seeds 1 in each cell .. .. 6. Lepidium.

Alpine herbs with sweet-scented flowers. Pods large, much compressed, obovate, very broadly winged. Seeds numerous .. 7. Notothlaspi.

N. wallii Cheesem. 57 (1927) 92.
Ch. " (Cheesem.) Allan. 76 (1947) 594
71 (1941) 86.

1. NASTURTIUM R. Br. 1812.

Glabrous or pubescent branched herbs. Leaves generally pinnate or pinnately lobed, sometimes entire. Flowers small, yellow or white. Sepals short, equal, spreading. Petals short, scarcely clawed. Stamens 2, 4, or 6. Stigma entire or 2-lobed. Pod almost terete, long or short; valves generally 1-nerved; septum thin, transparent. Seeds small, turgid, usually arranged in two rows; cotyledons accumbent.

A genus of nearly 50 species, some of them very widely dispersed, but most abundant in the temperate and warm regions of the Northern Hemisphere.

In this edition I have included in *Nasturtium* certain species previously placed by Hooker and others in the genus *Cardamine*, from which, however, they clearly differ in the seeds being 2-seriate. In a paper printed in the Trans. N.Z. Inst. (vol. xliii (1911) 178) I have given the chief reasons for the change.

A. Rootstock slender, short.

Slender leafy herb 6–20 in. Leaves lyrately pinnatifid. Flowers yellow .. .. 1. *N. palustre.*
Coarse glabrous herb. Leaves entire or sinuate. Flowers white.. 2. *N. stylosum.*

B. Rootstock stout, as thick as the finger, crowned with numerous rosulate radical leaves.

Flowering stems 6–18 in. Leaves almost glabrous. Pods narrow, $\frac{1}{15}$–$\frac{1}{12}$ in. broad .. .. 3. *N. fastigiatum.*
Flowering stems 6–20 in. Leaves villous, spathulate. Pods broad, turgid, $\frac{1}{6}$–$\frac{1}{4}$ in. broad .. .. 4. *N. latesiliqua.*
Flowering stems 6–20 in. Leaves glabrous, linear, with few projecting teeth. Pod broad, turgid .. .. 5. *N. Gibbsii.*
Flowering stems short, dense, 2–4 in. Leaves covered with stellate pubescence. Pods narrow .. .. 6. *N. Enysii.*

Cheesem.-annis

Rorippa sylvestris (L.) Besser — naturalised.

1. **N. palustre** *DC. Syst.* ii (1821) 191.—A slender leafy branched herb with weak or decumbent stems 6–20 in. long, glabrous or slightly hairy. Leaves variable, usually lyrately pinnatifid, auricled at the base with the lobes toothed or irregularly lobed, sometimes almost entire, toothed or sinuate-lobed. Flowers small, yellow, in lax racemes. Pedicels slender, ebracteate. Petals about equalling the sepals. Pods oblong, turgid, slightly curved when ripe, $\frac{1}{6}$–$\frac{1}{4}$ in. long. Seeds numerous, crowded, in 2 series.—*Hook. f. Handb. N.Z. Fl.* (1864) 10; *T. Kirk Students' Fl.* (1899) 25; *Cheesem. Man. N.Z. Fl.* (1906) 31. N. terrestre *R. Br. in Ait. Hort. Kew.* iv (1812) 110; *Hook. f. Fl. Nov. Zel.* i (1853) 14. N. sylvestre *A. Rich. Fl. Nouv. Zel.* (1832) 309 (*not of R. Br.*). *A. Cunn. Precur.* (1838) n. 625; *Raoul Choix* (1846) 47.

North and South Islands: Common in moist places from the North Cape to the Bluff. Usually in lowland districts, but ascending to over 2000 ft. in the river-valleys of Canterbury and Otago. Summer and autumn. An abundant plant in the temperate portions of both hemispheres.

The common water-cress of Europe (*Nasturtium officinale* R. Br.) is now plentifully naturalized throughout New Zealand. It is easily known by its aquatic habit, creeping or floating stem, pinnate leaves, and white flowers.

2. **N. stylosum** *O. E. Schulz in Engl. Bot. Jahr.* xxxii (1903) 596.—A tall, rather coarse, perfectly glabrous leafy branching herb 2–4 ft. high; erect or decumbent at the base; branches long, divaricating. Leaves alternate, 3–5 in. long, oblong-lanceolate or oblong-spathulate, entire or more usually minutely and remotely sinuate-toothed, sometimes lobed or pinnatifid at the base; uppermost sessile, auricled at the base; lower on long petioles. Racemes very long, 1–2 ft. or more, erect; pedicels short, stout. Pods

horizontally spreading, 1–1½ in. long, ½ in. broad, style stout. Seeds red-brown; testa reticulate. — Cardamine stylosa *DC. Syst. Veg.* ii (1821) 248; *Hook. f. Fl. Tasm.* i (1860) 18; *Handb. N.Z. Fl.* (1864) 12; *Benth. Fl. Austral.* i (1863) 68; *T. Kirk Students' Fl.* (1899) 27; *Cheesem. Man. N.Z. Fl.* (1906) 34. C. divaricata *Hook. f. Fl. Nov. Zel.* i (1853) 13. Arabis gigantea *Hook. Ic. Plant.* (1840) t. 259.

KERMADEC ISLANDS: Not uncommon on Macaulay Island, *T. F. C.* NORTH AND SOUTH ISLANDS: Auckland—Various localities from Kaitaia and Mangonui to Te Aroha, but not common, *Cunningham, T. Kirk, T. F. C.;* East Cape and Tolaga Bay, *Bishop Williams!* Marlborough—Queen Charlotte Sound, *Banks* and *Solander!* Picton, *J. Rutland;* Mount Stokes, *J. H. Macmahon!*

Readily known by its large size and branched leafy habit, long racemes, horizontally spreading pods and pitted seeds. It is a common Australian and Tasmanian plant.

3. **N. fastigiatum** *Cheesem. in Trans. N.Z. Inst.* xliii (1911) 179.— Rootstock long, stout, tapering, often as thick as the finger, bearing at the top a rosette of densely crowded radical leaves. Leaves 1½–3 in. long, linear- or lanceolate-spathulate, acute, sharply and deeply inciso-serrate, gradually narrowed into a broad flat petiole, thick and coriaceous, glabrous or with a few weak hairs on the margins. Cauline leaves similar, but smaller and less toothed. Flowering stems usually several springing from the top of the rootstock among the radical leaves, simple or branched, 6–18 in. high. Flowers numerous, white, corymbose, about ⅓ in. diam. Petals ⅓ in. long, spathulate, on long claws. Pods erect or nearly so, straight or curved, acute at both ends, narrow-linear, 1–2 in. long, $\frac{1}{15}$–$\frac{1}{12}$ in. broad. Seeds compressed, red-brown. — Cardamine fastigiata *Hook. f. Handb. N.Z. Fl.* (1864) 13; *T. Kirk Students' Fl.* (1899) 28; *Cheesem. Man. N.Z. Fl.* (1906) 34. Arabis fastigiata *Hook. f. Fl. Nov. Zel.* ii (1855) 324. Pachycladon elongata *Buch. in Trans. N.Z. Inst.* xix (1887) 216. Notothlaspi Hookeri *Buch. l.c.* xx (1888) 255, t. 13.

SOUTH ISLAND: Nelson—Wairau Gorge, *Sinclair! T. F. C.;* Mount Percival and mountains overlooking the Upper Clarence Valley, *T. F. C., Petrie!* Spenser Mountains, *R. M. Laing.* Marlborough—Macrae's Run, *Monro;* Upper Awatere, *T. Kirk!* Otago—Eyre Mountains, *Poppelwell;* Garvie Mountains, *Crosby Smith.* Altitudinal range 2500–5000 ft.

4. **N. latesiliqua** *Cheesem. in Trans. N.Z. Inst.* xliii (1911) 179.— Rootstock stout, spongy, as thick as the finger, often branched at the top, each division furnished with a rosette of densely crowded radical leaves. Flowering stems few or many, erect or spreading, branched, leafy at the base, 6–24 in. high. Radical leaves 3–6 in. long, ⅓–⅔ in. broad, narrow linear-spathulate to obovate-spathulate, gradually narrowed to the base, coarsely serrate above, thick and coriaceous, more or less villous, especially on the margins. Upper cauline leaves smaller, lanceolate, nearly entire. Flowers rather large, white, very numerous. Petals nearly ½ in. long, spathulate, on long claws. Pods erect or suberect, usually curved, somewhat turgid, 1½–2½ in. long, $\frac{1}{6}$–¼ in. broad. Seeds numerous, compressed, reddish-brown.—*Ill. N.Z. Fl.* i (1914) t. 9. Cardamine latesiliqua *Cheesem. in Trans. N.Z. Inst.* xv (1883) 298; *T. Kirk Students' Fl.* (1899) 28; *Cheesem. Man. N.Z. Fl.* (1906) 35.

SOUTH ISLAND: Nelson—Mount Arthur, on rocky slopes, *T. F. C., Bryant! F. G. Gibbs!* Mount Owen, *T. F. C., W. Townson!* Raglan Mountains, *T. F. C.* Altitudinal range 3000–5500 ft. December–January.

A handsome plant, with much of the habit and general appearance of *N. fastigiatum*, but easily distinguished by the villous leaves, larger flowers, and much broader pods, which have a turgid appearance very unusual in the genus.

CHEESEMANIA O.E. Schulz
in Notizbl. Bot. Gast. u, Mus. Berlin - Dahlem
X. n. 96 (1929) 551.

...aufrecht - abstehend, lineal bis lang- ...gemacht. Pet.

CHEESEMANIA O.E. Schultz.

Nach dem um die Flora von Neu-Seeland hochverdienten Botaniker T. F. Cheeseman; geb. 1864 in Hull (Yorkshire), kam 1854 nach Auckland, uo er 15. Opt. 1923 gestnben ist; Kew Bull. (1924) 27. - Cardanine radicata Hook.f. Icm. pl. (1852) t.882. - Fig. 329 G-L.

5 Arten in Tasmanien und Neu-Seeland auf den Gebirgen; C. radicata (Hook.f.) O.E. Schulz. vollig kahl, scholen heit, Tasmanien ...e- siliqua (Cheeseman) O. ... n Haaren, ...and

... Schulz
... Hook.f. 1855) kahl oder ... benaart, Scholen schmal, ebenda; C. Enysii (Cheeseman) O.E. Schulz.

Pods broad 1
Pods narrow 2

1. Frs. villous, spathulate . . . . latesiliqua
   Frs glabrous, linear . . . . . gibbsii
2. Frs densely stellate pubescent . enysii
   Frs glabrous or nearly so . . . fastigiata

horizontally spreading, 1–1½ in. long, ½ in. broad, style stout. Seeds red-brown; testa reticulate. — Cardamine stylosa *DC. Syst. Veg.* ii (1821) 248; *Hook. f. Fl. Tasm.* i (1860) 18; *Handb. N.Z. Fl.* (1864) 12; *Benth. Fl. Austral.* i (1863) 68; *T. Kirk Students' Fl.* (1899) 27; *Cheesem. Man. N.Z. Fl.* (1906) 34. C. divaricata *Hook. f. Fl. Nov. Zel.* i (1853) 13. Arabis gigantea *Hook. Ic. Plant.* (1840) t. 259.

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Readily known by its large size and branched leafy habit, long racemes, horizontally spreading pods and pitted seeds. It is a common Australian and Tasmanian plant.

(Hk. f.)

3. **N. fastigiatum** *Cheesem. in Trans. N.Z. Inst.* xliii (1911) 179.— Rootstock long, stout, tapering, often as thick as the finger, bearing at the top a rosette of densely crowded radical leaves. Leaves 1½–3 in. long, linear- or lanceolate-spathulate, acute, sharply and deeply inciso-serrate, gradually narrowed into a broad flat petiole, thick and coriaceous, glabrous or with a few weak hairs on the margins. Cauline leaves similar, but smaller and less toothed. Flowering stems usually several springing from the top of the rootstock among the radical leaves, simple or branched,

N. fastigiatum
= Cheesemania fastigiata (Hook.f.) O.E.Schulz

Man. N.Z. Fl. (1906) 34. Arabis fastigiata *Hook. f. Fl. Nov. Zel.* ii (1855) 324. Pachycladon elongata *Buch. in Trans. N.Z. Inst.* xix (1887) 216. Nototholaspi Hookeri *Buch. l.c.* xx (1888) 255, t. 13.

SOUTH ISLAND: Nelson—Wairau Gorge, *Sinclair! T. F. C.;* Mount Percival and mountains overlooking the Upper Clarence Valley, *T. F. C., Petrie!* Spenser Mountains, *R. M. Laing.* Marlborough—Macrae's Run, *Monro;* Upper Awatere, *T. Kirk!* Otago—Eyre Mountains, *Poppelwell;* Garvie Mountains, *Crosby Smith.* Altitudinal range 2500–5000 ft.

var. stellata allan T. 76:593.

4. **N. latesiliqua** *Cheesem. in Trans. N.Z. Inst.* xliii (1911) 179.— Rootstock stout, spongy, as thick as the finger, often branched at the top, each division furnished with a rosette of densely crowded radical leaves. Flowering stems few or many, erect or spreading, branched, leafy at the base, 6–24 in. high. Radical leaves 3–6 in. long, ½–⅔ in. broad, narrow

N. latesiliqua Cheesm.
= CHEESEMANIA LATESILIQUA (Cheesem.) O.E.Schulz
see Pflanzenfamilien 2 Auflage, Band 17B (1936) p.538.

reddish brown. — *Fl. N.Z.* i (1914) t. 3. Cardamine latesiliqua *Cheesem. in Trans. N.Z. Inst.* xv (1883) 298; *T. Kirk Students' Fl.* (1899) 28; *Cheesem. Man. N.Z. Fl.* (1906) 35.

SOUTH ISLAND: Nelson—Mount Arthur, on rocky slopes, *T. F. C., Bryant! F. G. Gibbs!* Mount Owen, *T. F. C., W. Townson!* Raglan Mountains, *T. F. C.* Altitudinal range 3000–5500 ft. December–January.

A handsome plant, with much of the habit and general appearance of *N. fastigiatum*, but easily distinguished by the villous leaves, larger flowers, and much broader pods, which have a turgid appearance very unusual in the genus.

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in Notizbl. Bot. Gast. u, Mus. Berlin - Dahlem
K. n. 96 (1929) 551.

...aufrecht - abstehend, lineal bis lang- ...Pet.

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5 Arten in Tasmanien und Neu-Seeland auf den Gebirgen; C. radicata (Hook.f.) O.E. Schulz, vollig kahl, scholen heit, Tasmanien, C. latesiliqua (Cheeseman) O. E. Schulz, mit astigen Haaren besetzh, schoten auch breit, Neu-Seeland auf den Sudinsel; C. Gittsii (Cheeseman) O.E. Schulz; C. fastigiata (Hook.f.) O.E. Schulz (Arabis fastigiata Hook.f. 1855) kahl oder sparlich behaart, Scholen schmal, ebenda; C. Enysii (Cheeseman) O.E. Schulz.

Pods broad 1
Pods narrow 2

1. Frs. villous, spathulate . . . . latesiliqua
   Frs glabrous, linear . . . . . gibbsii
2. Frs densely stellate pubescent . enysii
   Frs glabrous or nearly so . . . fastigiata

horizontally spreading, 1–1½ in. long, ½ in. broad, style stout. Seeds red-brown; testa reticulate. — Cardamine stylosa *DC. Syst. Veg.* ii (1821) 248; *Hook. f. Fl. Tasm.* i (1860) 18; *Handb. N.Z. Fl.* (1864) 22; *Benth. Fl. Austral.* i (1863) 33.

CHEESEMANIA O.E. Schulz
in Notizbl. Bot. Gast. u, Mus. Berlin - Dahlem
X. n. 96 (1929) 551.

Sep. aufrecht - abstehend, lineal bis lang-
lick, stumpf, seitliche nicht gesackt. Pet.
weiss, spately, oben abgerundet. Filamante
lineal; Antheren langlich, Stumpf. Seitliche
Hongdrusen halbringformig innen offen, mit den
medianen verbunden. Pishill sitzend oder kaum
gestielt, ovar dunn zylindrisch, mit 12-36
samenantagen; griffel kurg oder o; Narbe
niedergedriicht. Schoten zienlich kurz, breit-
langlich oder lineal. Klappen abspringend, hock
-rig, mit dunnen Mittelneu und einigen wenig
sichtbaren Seitennerven; Plazenten dunn;
Scheidenand durchseheinend, mit kleinen,
unregelmassig polygonaten Epidermis zellen.
Samen zeveireihig, veakehrt-aiformig oder fast
kodesrund, floch, umberardet, bisweilen etuas ge
-chwangt, nicht verscee-eimend; schale runzelig
oder netzig; tamentrager kurz, verbreiterb;;
Keimling seitenwurzelig. - Aus-dauernde, kahle
oder mit einfachen und astigen Haaren besetzte
Kranter. Wurzelstock dick, schuppig, oben asti
und die rosettenformig zusanmengedranghen grund-
blatter tragend. Skezel aukleyend, beblattert.
Blatter + fleirchig, + teif gesagt, grundblatter
deutlich gestielt, skengelblatten in den kurzen
Blattsheil ver-schmalest. Tauben mit + zahbrei
hen Tragblatten. Bluten mittelgras. Fruchte
auf den Strelen fast aufrecht.

(reduced to a single pinnule in var. *uniflora*). Flowers small,
white .. .. 1. *C. heterophylla.*

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248 ; *I*
Benth. *J*

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gia
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N. Enysii
= Cheesemania Enysii (Cheesem.) O.E. Schulz.
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5. **N. Gibbsii** *Cheesem. n. sp.*—Very similar to *N. latesiliqua*, and like it with a stout woody rootstock as thick as the little finger. Radical leaves very numerous, but soon withering when the plant flowers, spreading, 3–7 in. long, consisting of a narrow-linear blade $\frac{1}{8}$–$\frac{1}{5}$ in. broad or sometimes even less, from which towards the top project 1–3 pairs of spreading or erecto-patent teeth $\frac{1}{5}$ in. long, more or less coriaceous, smooth and glabrous, or sometimes furnished with a few long hairs on the margins of the leaves. Cauline leaves similar to the radical, the lower ones broader. Flowering

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ılate,
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CHEESEMANIA
O. E. Schulz in Notizbl. Bot. Gart. u. Mus.
Berlin - Dahlem x n. 96 (1929) 551.
(4 species in N.Z. and 1 in Tasmania).

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projecting teeth towards the top of the leaf.

6. **N. Enysii** *Cheesem. in Trans. N.Z. Inst.* xliii (1911) 179.—Short, stout, 2–4 in. high. Rootstock thick and fleshy, perpendicular, $\frac{1}{2}$ in. diam., bearing at its summit numerous radical leaves, and a short flowering stem which is much branched from the base, and forms a rounded or pyramidal head 2–5 in. diam. Leaves $\frac{1}{2}$–$1\frac{1}{2}$ in. long, $\frac{1}{3}$–$\frac{1}{2}$ in. broad, oblong-spathulate, obtuse or subacute, narrowed into a broad flat petiole, rather thin, sharply serrate, sometimes almost pinnatifid, more or less densely clothed on both surfaces with stellate

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N. Gibbsii
= Cheesemania Gibbsii (Cheesem.) O.E. Schulz.
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South Island: Nelson — Spenser Mountains, *R. M. Laing.* Canterbury — Mountains at the head of the Broken River, *J. D. Enys* and *T. F. C.*; Cragieburn Mountains and the Candlestick Mountains, *Cockayne!* Otago—Mount Ida, *Petrie!*

A very remarkable plant, easily separated from the two preceding species by the smaller size, depressed habit, and stellate pubescence. My fruiting specimens are too immature to admit of the position of the radicle being satisfactorily made out.

2. CARDAMINE Linn. 1735

Annual or perennial often flaccid herbs, glabrous or slightly pubescent. Leaves entire or more frequently pinnately divided. Flowers white or purplish. Sepals equal at the base. Petals clawed. Stigma simple or 2-lobed. Pod long, narrow-linear, compressed; valves usually flat, opening elastically; septum membranous, transparent. Seeds numerous, flattened, in one series; cotyledons accumbent.

A rather large genus of nearly 100 species, inhabiting the temperate and cool regions of both hemispheres. Of the 5 species admitted in this work, 2 or possibly 3 are found in Fuegia, the remainder are endemic.

Slender, usually flaccid, 3–15 in. high. Leaves pinnate, 2–6-jugate (reduced to a single pinnule in var. *uniflora*). Flowers small, white .. .. 1. *C. heterophylla.*

horizon
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248 ;
Benth.

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South Island: Nelson—Ravines on the face of Mount Lockett, alt. 3500 ft., *F. G. Gibbs!*

Although clearly allied to *N. latesiliqua*, this differs in a marked manner in the taller and more slender glabrous habit, and particularly in the more numerous exceedingly narrow glabrous leaves, which are almost entire except for a few distant projecting teeth towards the top of the leaf.

6. **N. Enysii** *Cheesem. in Trans. N.Z. Inst.* xliii (1911) 179.—Short, stout, 2–4 in. high. Rootstock thick and fleshy, perpendicular, $\frac{1}{2}$ in. diam., bearing at its summit numerous radical leaves, and a short flowering stem which is much branched from the base, and forms a rounded or pyramidal head 2–5 in. diam. Leaves $\frac{1}{2}$–$1\frac{1}{2}$ in. long, $\frac{1}{3}$–$\frac{1}{2}$ in. broad, oblong-spathulate, obtuse or subacute, narrowed into a broad flat petiole, rather thin, sharply serrate, sometimes almost pinnatifid, more or less densely clothed on both surfaces with stellate pubescence. Cauline leaves linear or linear-spathulate, toothed towards the tip. Flowers numerous, corymbose, white. Pedicels slender, spreading, $\frac{1}{4}$–$\frac{1}{3}$ in. long. Petals spathulate, with long claws. Pods (immature) narrow-linear, flat, about 1 in. long. Seeds numerous, in 2 series.—Cardamine Enysii *Cheesem. ex T. Kirk Students' Fl.* (1899) 28; *Cheesem. Man. N.Z. Fl.* (1906) 35.

South Island: Nelson—Spenser Mountains, *R. M. Laing.* Canterbury—Mountains at the head of the Broken River, *J. D. Enys* and *T. F. C.*; Cragieburn Mountains and the Candlestick Mountains, *Cockayne!* Otago—Mount Ida, *Petrie!*

A very remarkable plant, easily separated from the two preceding species by the smaller size, depressed habit, and stellate pubescence. My fruiting specimens are too immature to admit of the position of the radicle being satisfactorily made out.

2. CARDAMINE Linn.

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A rather large genus of nearly 100 species, inhabiting the temperate and cool regions of both hemispheres. Of the 5 species admitted in this work, 2 or possibly 3 are found in Fuegia, the remainder are endemic.

Slender, usually flaccid, 3–15 in. high. Leaves pinnate, 2–6-jugate (reduced to a single pinnule in var. *uniflora*). Flowers small, white .. .. 1. *C. heterophylla.*

C. heterophylla Wood Bot. Mag. 1576 : 38.
Dentaria " " Nouth. Syn. 2. 1818 : 66.

Stout, fleshy. Leaves pinnate, 1–5-jugate. Flowers large, often ¼ in. diam., white, pink, or purple .. .. 2. *C. glacialis* var. *subcarnosa.*
Wiry, fragile, branched from the base. Leaves pinnate, 2–5-jugate. Flowers small, $\frac{1}{10}$ in. diam... .. .. 3. *C. corymbosa.*
Small, depressed. Leaves all radical, simple, spreading, entire or lobed. Flowers small, $\frac{1}{10}$ in. diam. .. .. 4. *C. depressa.*
Leaves all radical, simple; blade 2-lobed at the base. Flowers large, white, ⅓ in. diam. .. .. 5. *C. bilobata.*

(Forster)

1. **C. heterophylla** *O. E. Schulz in Engl. Bot. Jahr.* xxxii (1903) 487.—Rhizome descending, sometimes thickened towards the top, and clothed with the bases of the old leaves. Stems 3–15 in. high or more, branched from the base, erect or spreading, glabrous or sparsely clothed with whitish hairs. Leaves varying with the size of the plant; in large specimens the radical leaves are several and rosulate, 3–4 in. long, with 2–6 pairs of leaflets, the terminal leaflet usually the largest, reniform or orbicular, with 3–5 irregular shallow lobes or sinuate; the lateral often oblique, 3-dentate or -crenate. Cauline leaves ¾–2 in. long, 2–3-jugate or more rarely 1-jugate. In small specimens the size of the leaves and the number of the leaflets are much reduced; but the terminal leaflet is generally larger in proportion to the others. Racemes terminal, 6–15-flowered. Flowers small, white, $\frac{1}{6}$–$\frac{1}{5}$ in. diam. Pods erect or suberect, slender, flat, ¼–1 in. long, narrowed into a very short style.—C. debilis *Banks ex DC. Syst.* ii (1821) 265. C. hirsuta *Hook. f. Fl. Nov. Zel.* i (1853) 13; *Handb. N.Z. Fl.* (1864) 12; *T. Kirk Students' Fl.* (1899) 26; *Cheesem. Man. N.Z. Fl.* (1906) 32 (*but not of Linn.*). Sisymbriun heterophyllum *Forst. f. Prodr.* (1786) n. 250. T. N.Z. 271, 1908

Excluded by Schulz

See also Allan Woodsh.

Var. **uniflora** *Hook. f. Handb. N.Z. Fl.* (1864) 12.—Minute, the leaves reduced to a single pinnule. Flowers on a slender 1-flowered scape, rather large, sometimes ¼ in. diam. Cook. Rep. Sleu. Is. 514.

North and South Islands, Chatham Islands, Stewart Island: From the Three Kings Islands and the North Cape southwards, abundant in suitable localities from sea-level to 6500 ft. Var. *uniflora* is particularly abundant near the sea, but it is also seen in mountain districts, where it was originally discovered by Mr. Colenso.

In nearly all general works on the New Zealand Flora this well-known plant has been referred to the northern *C. hirsuta*. It is so closely allied thereto that it is not without considerable hesitation that I now follow O. E. Schulz, in his recent monograph of the genus, in altogether removing *C. hirsuta* from the list of New Zealand species, and in reviving Forster's name of *heterophylla* for our plant. Of the varieties of *C. hirsuta* admitted in the last edition of this work, var. *debilis* I now regard as the type of *C. heterophylla*; var. *corymbosa* is re-established as a distinct species; and var. *subcarnosa* is treated, as proposed by Schulz, as a variety of the South American *C. glacialis* DC. Var. *uniflora* remains, but will in all probability prove to be a distinct species But the mountain forms of the species are still much in need of a careful study and description by resident botanists.

2. **C. glacialis** *DC. var.* **subcarnosa** *O. E. Schulz in Engl. Bot. Jahr.* xxxii (1903) 542.—Stout, succulent, glabrous or nearly so, variable in size, ½–4½ in. high. Rhizome perennial, stout, spongy, often branched at the top, each division crowned with a rosette of densely crowded radical leaves, and with a short and stout flowering stem. Radical leaves ½–2½ in. long, pinnate; petiole ½ the length or nearly so, broadly sheathing at the base; leaflets 1–5 pairs, with a terminal one; terminal leaflet much the largest, ¼–¾ in. diam., entire or angularly sinuate-repand or -lobed; lateral similar but usually smaller, sessile or shortly petiolulate. Cauline leaves few, smaller and on shorter stalks; leaflets fewer and smaller. Racemes short and

dense, corymbose, probably elongating in fruit. Flowers usually numerous, rather large, $\frac{1}{6}$–$\frac{1}{4}$ in. diam., white, pink, or purple. Sepals sometimes purplish at the tip. Stigma broad, almost sessile. Ripe fruit not seen; in an immature state the pods are crowded, very short and broad; style almost wanting. C. hirsuta *Linn. var.* subcarnosa *Hook. f. Fl. Antarct.* i (1844) 5; *Handb. N.Z. Fl.* (1864) 12; *T. Kirk Students' Fl.* (1899) 26; *Cheesem. Man. N.Z. Fl.* (1906) 33.

Auckland and Campbell Islands: Not uncommon in stony debris or in moist grassy places, *Hooker, T. Kirk, Cockayne! B. C. Aston! J. S. Tennant! R. M. Laing!* Has been recorded from Macquarie Island on the authority of A. Hamilton, but I have seen no specimens.

Differs from any of the forms of *C. hirsuta*, under which it was placed by Hooker, in the stout and fleshy habit, perennial rhizome, large often coloured flowers, short and broad pods, and almost sessile stigma. It is much nearer to the southern *C. glacialis*, with which it was united by Schulz in his monograph of the genus. It also occurs in Chile, Fuegia, Falkland Islands, and Kerguelen Island.

3. **C. corymbosa** *Hook. f. Fl. Antarct.* i (1844) 6.—Small, wiry and fragile, branched from the base, $1\frac{1}{2}$–3 in. high, sparingly clothed with spreading hairs or quite glabrous. Root perennial. Stem short, decumbent or ascending; branches slender, almost filiform, spreading and flexuous, sparingly leafy. Leaves few, long-petioled, 1–2 in. long, pinnately divided; leaflets 3–5, petiolulate, rounded or cordate or broadly ovate, the terminal one much the largest, sometimes $\frac{1}{4}$ in. diam., the lateral usually remote. Flowers minute, $\frac{1}{10}$ in. diam. or less, irregularly fascicled or corymbose, or solitary and axillary. Petals twice the length of the sepals. Pod narrow-linear, strict, erect, flat, $\frac{1}{2}$ in. long; seeds 10–15.—*Ic. Plant.* (1844) t. 686; *O. E. Schulz in Engl. Bot. Jahr.* xxxii (1903) 561; *Cheesem. Vascl. Fl. Macquarie Is.* (1919) 17. C. hirsuta *Linn. var.* corymbosa *Hook. f. Handb. N.Z. Fl.* (1864) 12.

Auckland and Campbell Islands: Port Ross, *J. S. Tennant! Cockayne;* Campbell Island, turfy ground near the sea, *Hooker, R. M. Laing!* Macquarie Island: Apparently common, *A. Hamilton* (1894), *H. Hamilton* (1912–13)! Also recorded from Orange Harbour, Fuegia, but I have seen no specimens from the mainland of New Zealand.

In addition to the ordinary inflorescence, *C. corymbosa* produces very curious cleistogamic flowers, first noticed by Dr. Schulz during an examination of Hooker's specimens, collected 80 years ago. Some observed by myself on one of Tennant's specimens were barely visible to the unaided eye. There were 4 scale-like sepals, no petals, and 4 small stamens. The ovary was short, conical, 2-celled, each cell containing 2–6 ovules. Similar cleistogamic flowers have been described from the South American *C. chenopodifolia.*

4. **C. depressa** *Hook. f. Fl. Antarct.* i (1844) 6.—Perennial, small, stemless, glabrous or nearly so, forming rosettes 1–2 in. diam. Leaves numerous, crowded, spreading, or the upper suberect, simple, oblong-obovate or obovate-spathulate, rounded at the apex, narrowed at the base into a petiole longer or shorter than the blade, shortly lobed with the lobes rounded, $\frac{1}{2}$–1 in. long including the petiole. Flowers small, $\frac{1}{8}$ in. long, either solitary on 1-flowered scapes, or forming a few- or many-flowered corymbose raceme. Pods erect, $\frac{1}{2}$–1 in. long, style short.—*Handb. N.Z. Fl.* (1864) 12; *T. Kirk Students' Fl.* (1899) 27; *O. E. Schulz in Engl. Bot. Jahr.* xxxii (1903) 560; *Cheesem. Man. N.Z. Fl.* (1906) 33.

Var. **stellata** *Hook. f. Handb. N.Z. Fl.* (1864) 12.—Smaller, more or less pilose. Leaves entire or nearly so.—*T. Kirk Students' Fl.* (1899) 37; *Cheesem. Man. N.Z. Fl.* (1906) 33. C. stellata *Hook. f. Fl. Antarct.* i (1844) 7, t. 4A.

see Schultz. Flowergarden. 175: 528

SOUTH ISLAND: Nelson—Raglan Mountains, alt. 5000 ft., and mountains above the Wairau Gorge, 6000 ft., *T. F. C.*; Lake Tennyson, *R. M. Laing.* Canterbury—Mount Catherine, *Cockayne*; Mount Arrowsmith, *R. M. Laing* and *Cockayne*; Mount Dobson, 5000 ft., *T. F. C.* Otago—Lake Hauroko, *Crosby Smith.* THE SNARES, AUCKLAND AND CAMPBELL ISLANDS: Both varieties not uncommon, *Hooker, T. Kirk!* and others.

Schulz, in his monograph of the genus, has restored var. *stellata* to the rank of a species. But the differences separating it are very slight.

5. **C. bilobata** *T. Kirk Students' Fl.* (1899) 27. — Rootstock stout, often long and branched at the top. Leaves all radical, on slender petioles 1–4 in. long; blade $\frac{1}{2}$–$1\frac{1}{2}$ in. long; quite smooth and glabrous, oblong or obovate, in small specimens sometimes entire, but usually pinnatifid with a very large terminal lobe and 1 or 2 pairs of small spreading lobes at its base. Flowering stems 1–3, few-flowered, naked; pedicels slender, $\frac{1}{2}$–1 in. long or more. Flowers large, sometimes nearly $\frac{1}{2}$ in. diam. Pods $\frac{3}{4}$–1 in. long, narrow-linear, spreading; style long and slender.—*Cheesem. Man. N.Z. Fl.* (1906) 34.

SOUTH ISLAND: Canterbury—Limestone debris by the Broken River, *T. F. C.*; Hooker Valley, Mount Cook, *T. F. C.* Otago—Kurow Mountains, Mount Ida Range, Hector Mountains, *Petrie!* Altitudinal range 1000–3000 ft.

This appears to me to be a perfectly distinct species, well marked by the peculiarly lobed leaves, large flowers, and the large pods with long slender styles. I have gathered a very similar plant in the Upper Clarence Valley, but the specimens are too imperfect to pronounce upon.

I Schizocarpus Schulz, 1924. Pflanzenr. IV. 86. (IV) 165. 165. (24).

3. **SISYMBRIUM** Linn. 1735

Annual or more rarely perennial erect herbs, either glabrous or more or less tomentose or hairy. Flowers small, white or yellow, usually in rather lax racemes. Sepals short or long, equal or the lateral saccate. Petals with long claws. Style short; stigma 2-lobed. Pod long, slender, terete or slightly compressed; valves convex; septum membranous. Seeds usually numerous, not margined, in a single row in each cell; cotyledons incumbent.

A genus of about 60 species, widely spread in Europe and from thence to eastern Asia, and with a few representatives in most temperate countries. The single New Zealand species is endemic.

Pflz. 9. 176

I S. **novae-zelandiae** (*Hook. f.*) Schulz Pflz. 9. 176: 607. *Handb. N.Z. Fl.* (1864) 11.—An erect slender sparingly branched herb 6–18 in. high, usually hoary with minute stellate pubescence, rarely almost glabrous. Leaves chiefly radical, very variable in size and shape, $\frac{1}{2}$–2 in. long; petiole long or short; blade $\frac{1}{4}$–1 in., obovate to narrow-oblong, quite entire or sinuate-toothed or pinnatifid; lobes usually blunt. Cauline leaves few, smaller. Flowers small, white. Fruiting-racemes rather lax; pedicels slender, $\frac{1}{8}$–$\frac{3}{4}$ in. long. Pods 1–2 in. long, $\frac{1}{20}$–$\frac{1}{15}$ in. broad, narrow-linear, obtuse, spreading, glabrous; valves slightly convex, midrib distinct; style very short. Seeds numerous, small; cotyledons incumbent.—*T. Kirk Students' Fl.* (1899) 30; *Cheesem. Man. N.Z. Fl.* (1906) 36.

SOUTH ISLAND: Nelson—Wairau Gorge, *W. T. L. Travers, D. Rough.* Canterbury — Broken River, Coleridge Pass, Porter's Pass, *T. Kirk! J. D. Enys!* Mackenzie Plains and Lake Tekapo, *T. F. C.* Otago—Not uncommon in the eastern and central portions of the district, *Petrie!* Altitudinal range from sea-level to 3000 ft. December–January.

4. **PACHYCLADON** Hook. f. 1864.

A short stout depressed alpine herb, clothed with stellate pubescence. Rootstock long, thick and fleshy. Leaves small, rosulate. Flowers small, white. Sepals equal. Petals with long claws. Stamens free, toothless. Pod laterally compressed, linear-oblong; valves boat-shaped, keeled, not winged; nerves obscure; septum imperfect. Seeds 3–5 in each cell, obovoid; funicles short. Cotyledons incumbent.

The genus consists of a single species, confined to the southern portion of the Dominion. Sir J. D. Hooker remarks that in technical characters it is intermediate between the tribes *Sisymbrieae* and *Lepidineae*, but is probably referable to the latter.

1. **P. novae-zelandiae** *Hook. f. Handb. N.Z. Fl.* (1864) 724.—Root very long, fusiform, stout and fleshy, as thick as the finger, in old specimens branched above, crowned with a dense rosette of imbricating radical leaves.

Capsella procumbens, Fries.
not native to N.Z. see T.N.Z.I.
vol. 57, p. 62. (Ckn. & Allan).

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SOUTH ISLAND:- Otago—Mount Alta, *Hector* and *Buchanan!* Mount Bonpland, *Cockayne;* summit of Rock and Pillar Range, Mount St. Bathan's, Mount Pisa, Mount Kyeburn, Mount Cardrona, &c., *Petrie!* 4500–6500 ft.

A very singular plant. Mr. Buchanan's *P. glabra* (Trans N.Z. Inst. xiv (1882) t. 24, f. 2) is a form with rather larger and almost glabrous leaves, with sharply pointed ascending lobes. It passes insensibly into the ordinary state.

5. **CAPSELLA** Medicus.

Annual or rarely perennial branched herbs, of small size and weak habit, glabrous or pilose. Radical leaves entire or pinnatifid. Flowers small, white, racemed. Sepals spreading, equal at the base. Petals short. Pods oblong, ovoid, or obcordate, laterally compressed; valves convex or boat-shaped; septum thin; style short. Seeds numerous, in 2 rows. Cotyledons incumbent.

A small genus, scattered over the temperate regions of both hemispheres.

= Hymenobolus p. Nutt. 1832

1. **C. procumbens** *Fries Novit. Fl. Suec. Mant.* i (1823) 14.—Slender, perfectly glabrous. Stems numerous from the root, 2–6 in. long, decumbent at the base, ascending at the tips. Leaves $\frac{1}{4}$–$\frac{3}{4}$ in. long; lower ovate, oblong, or spathulate, entire or lobed or irregularly pinnatifid, petioled; upper smaller, more sessile, often entire. Flowers white, very small. Racemes elongating in fruit; pedicels filiform, spreading. Pod ovoid, $\frac{1}{6}$–$\frac{1}{5}$ in. long; valves boat-shaped. Seeds 10–15 in each cell.—*Benth. Fl. Austral.* i (1863) 81; *Cheesem. Man. N.Z. Fl.* (1906) 37. C. elliptica *C. A. Mey. in Ledeb. Fl. Alt.* iii (1831) 199; *T. Kirk Students' Fl.* (1899) 33.

SOUTH ISLAND: Otago—On cliffs exposed to sea-spray: Oamaru; Waikouaiti; near Dunedin; *Petrie!* September–October.

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Schulz 1735 ... 165. (A).

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SOUTH ISLAND: Otago—Mount Alta, *Hector* and *Buchanan!* Mount Bonpland, *Cockayne;* summit of Rock and Pillar Range, Mount St. Bathan's, Mount Pisa, Mount Kyeburn, Mount Cardrona, &c., *Petrie!* 4500–6500 ft.

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SOUTH ISLAND: Otago—On cliffs exposed to sea-spray: Oamaru; Waikouaiti; near Dunedin; *Petrie!* September–October.

I doubt this plant being a true native of New Zealand, and Sir J. D. Hooker has expressed the same opinion with regard to its supposed nativity in Australia and Tasmania. (See "Flora Tasmania," vol. i, p. 23.) The allied *C. bursa pastoris* Moench, the common "Shepherd's purse," is now established as a weed in most parts of the Dominion. It is an erect annual, with spreading pinnatifid radical leaves and triangular cuneate or obcordate pods, arranged in a long lax raceme.

6. **LEPIDIUM** Linn.

Erect or spreading, glabrous or pubescent, annual or perennial herbs, sometimes almost shubby. Leaves entire or divided. Flowers small, white, ebracteate. Sepals short, equal at the base. Petals short, equal, sometimes wanting. Stamens often reduced to 4 or 2. Pods variable, oblong, ovate, obcordate, or orbicular, much compressed laterally, notched at the summit or entire, winged or not; septum narrow, membranous. Seeds 1 in each cell, suspended from the top of the septum; cotyledons incumbent.

A large genus of over 100 species, several cosmopolitan in their distribution. The New Zealand species are highly variable, and several are very difficult of discrimination. All are endemic.

Since the publication of the first edition of this work the whole genus has been ably monographed by Dr. A. Thellung, of Winterthur, Switzerland. Students will find much additional matter in Dr. Thellung's memoir.

A. Leaves undivided; serrate, crenate, or quite entire; never pinnate or pinnatifid.

Stout, erect or diffuse, 12–24 in. high. Leaves sharply serrate. Pods entire, not winged .. .. 1. *L. oleraceum.*

Slender, flexuous, suberect, 12–18 in. Leaves spathulate, serrate above. Pods winged and notched above .. .. .. 2. *L. Banksii.*

Slender, decumbent, 9–12 in. Leaves long-petioled, crenate. Pods ovate, winged and notched above .. .. .. 3. *L. obtusatum.*

Stems prostrate, filiform, 2–5 in. Leaves linear-spathulate, $\frac{1}{3}$–1 in., entire. Pods ovate-orbicular, notched .. .. .. 4. *L. Kirkii.*

B. Lower leaves pinnate or pinnatifid.

* Flowers hermaphrodite.

Procumbent, glabrous. Leaves pinnatifid, segments toothed at the tips. Racemes short, lateral. Pods ovate .. .. 5. *L. flexicaule.*

Procumbent or suberect, hairy. Leaves pinnate, segments finely serrate on the upper edge. Racemes long, terminal. Pods minute, orbicular .. .. 6. *L. tenuicaule.*

** Flowers dioecious.

Almost glabrous. Erect, leafy, 6–12 in. high, paniculately branched above. Pods ovate .. .. 7. *L. Kawarau.*

Hoary and scabrid. Erect, strict, 2–5 in. high. Leaves almost all radical, coriaceous. Racemes short, dense. Pods ovate .. 8. *L. Matau.*

Hairy. Suberect, 2–5 in. high. Root very long and stout. Leaves all radical. Racemes lax, open. Pods ovate-rhomboid .. 9. *L. sisymbrioides.*

1. **L. oleraceum** *Forst. f. Prodr.* (1786) n. 248.—Stout or slender, erect or diffuse, perfectly glabrous, 10–24 in. high. Stem branched, leafy above, often naked and woody below, scarred. Leaves 1–4 in. long, obovate- or oblong-spathulate to narrow-spathulate, narrowed into a short flat petiole, sharply serrate or incised; upper smaller and narrower, more entire, toothed at the tip only. Flowers numerous, in terminal simple or branched racemes, in large specimens often corymbosely arranged at the ends of the branches. Stamens 4. Pods ovate or ovate-oblong, subacute, wingless, entire at the tip, $\frac{1}{6}$ in. long; pedicels slender, spreading.—*Forst. f. Pl. Esc.* (1786) 30;

Willd. Sp. Plant. iii (1800) 437; *A. Cunn. Precur.* (1838) n. 628; *Raoul Choix* (1846) 47; *Hook. f. Fl. Nov. Zel.* i (1853) 15; *Handb. N.Z. Fl.* (1864) 14; *T. Kirk Students' Fl.* (1899) 34; *Cheesem. Man. N.Z. Fl.* (1906) 38, *and Ill. N.Z. Fl.* i (1914) t. 10; *Thellung Monog. Lepidium* (1906) 291. Nasturtium oleraceum *O. Kuntze Revis.* i (1891) 937.

Var. **frondosum** *T. Kirk l.c.*—Stout, fleshy, much branched. Leaves large, 2–5 in., broadly oblong or cuneate-oblong, serrate.

Var. **acutidentatum** *T. Kirk l.c.*—Branches slender, leafy. Leaves 1–2 in., oblong- or linear-spathulate, acutely toothed towards the tip.

Var. **serrulatum** *Thellung Monog. Lepidium* (1906) 293.—Leaves obovate, finely and regularly serrate from the middle to the apex.

KERMADEC ISLANDS: *T. F. C., Miss Shakespear! W. R. B. Oliver!* NORTH ISLAND: Var. *frondosum: Banks* and *Solander;* Three Kings Islands, Little Barrier Island, Cuvier Island, Karewa Island, *T. F. C.;* Port Knights Islands, *Cockayne;* coast near Wellington, *B. C. Aston!* Var. *acutidentatum:* Hen and Chickens Islands, Little Barrier Island, and in many localities near the sea, *T. F. C.* SOUTH ISLAND: Queen Charlotte Sound, *Banks* and *Solander, J. H. Macmahon!* Banks Peninsula, *R. M. Laing! J. B. Armstrong;* Oamaru, Port Chalmers, Catlin's River, *Petrie!* STEWART ISLAND: *T. Kirk, Crosby Smith, Poppelwell.* THE SNARES: *T. Kirk, B. C. Aston!* AUCKLAND ISLANDS: *General Bolton, T. Kirk! J. S. Tennant!* CHATHAM ISLANDS: *H. H. Travers, F. A. D. Cox!* *Nau.* November–March.

Best known as "Cook's scurvy-grass." The entire plant has a heavy disagreeable smell and hot biting taste. It was originally discovered by Banks and Solander during Cook's first voyage, and at that time must have been abundant, for Dr. Solander speaks of it as "*copiose in littoribus marinis,*" and Cook states that boat-loads of it were collected and used as an antiscorbutic by the crew. It is now quite extinct in several of the localities he visited, and is fast becoming rare in others. Its disappearance is due to cattle and sheep, which greedily eat it down in any locality they can reach. The figure in the unpublished Banksian plates represents var. *frondosum;* but the specimens in the set of Banks and Solander's plants presented to the Dominion by the Trustees of the British Museum all belong to var. *acutidentatum.*

2. **L. Banksii** *T. Kirk Students' Fl.* (1899) 35.—Perfectly glabrous. Stems slender, flexuous, branched, suberect, 12–18 in. long. Leaves 1–2 in., distant, oblong- or linear-spathulate, sharply serrate or toothed above, below gradually narrowed into a short petiole or almost sessile. Racemes terminal. Flowers small. Stamens 4. Pods ovate, cordate at the base, slightly winged, broadly notched above; style equal to or slightly exceeding the notch.—*Cheesem. Man. N.Z. Fl.* (1906) 39; *Thellung Monog. Lepidium* (1906) 300. L. oleraceum *A. Rich. Fl. Nouv. Zel.* (1832) 310, t. 35 (*not of Forst.*).

SOUTH ISLAND: Marlborough—Queen Charlotte Sound and Astrolabe Harbour, *A. Richard;* Pelorus Sound, *J. Rutland!* Kenepuru, *J. H. Macmahon!* Westland—Open Bay Islands, *Cockayne* (*fide Thellung*).

Mr. Kirk appears to have founded this species on A. Richard's plate, quoted above, and on a single specimen collected by Mr. Rutland in Pelorus Sound. Judging from this scanty material, there appears to be little to separate it from *L. oleraceum* var. *acutidentatum*, except the slightly winged pod notched at the summit. But some of Mr. Petrie's Otago specimens of *L. oleraceum* show a minute notch, as also do those collected by Mr. Cox on the Chatham Islands. I much fear that the species is of doubtful validity.

3. **L. obtusatum** *T. Kirk in Trans. N.Z. Inst.* xxiv (1892) 423.—Stems leafy, branched, prostrate or suberect, 6–12 in. long. Lower leaves on broad flat petioles, sometimes 2 in. long; blade 1–2 in., oblong or oblong-

spathulate, gradually narrowed into the petiole, obtuse, coarsely crenate or serrate. Cauline leaves sessile or nearly so, obovate or oblong-spathulate. Racemes numerous, terminating small leafy branches. Flowers small, white. Stamens 4. Fruiting-pedicels slender, $\frac{1}{5}$ in. long. Pods broadly ovate, slightly winged above, with a broad shallow notch; style short, stout, about equalling the notch.—*Students' Fl.* (1899) 35; *Cheesem. Man. N.Z. Fl.* (1906) 39; *Thellung Monog. Lepidium* (1906) 301.

North Island: Sea-cliffs to the north of the Manukau Harbour, *T. F. C.*; maritime rocks at the entrance to Port Nicholson, *T. Kirk! B. C. Aston!* October–February.

This is allied to *L. oleraceum*, but can be readily distinguished by the slender often prostrate habit, the long petioles of the radical leaves, their crenate margins, and by the notched pods. My specimens from the north of the Manukau Harbour are suberect; Mr. Kirk's are mostly prostrate.

4. **L. Kirkii** *Petrie in Trans. N.Z. Inst.* xxii (1890) 439.—Small, prostrate, glabrous or nearly so. Stems many from the top of a short stout rootstock, prostrate, branched, flexuous, almost filiform, 2–4 in. long. Radical leaves entire, narrow-linear or linear-spathulate, $\frac{1}{3}$–1 in. long, sheathing at the base, obtuse at the tip; cauline similar but smaller. Racemes short, elongating in fruit. Flowers minute. Sepals ovate, concave. Petals narrow, slightly shorter than the sepals. Stamens 4. Pods on slender pedicels about their own length, ovate-orbicular, minutely notched at the tip; style short, exceeding the notch.—*T. Kirk Students' Fl.* (1899) 40; *Cheesem. Man. N.Z. Fl.* (1906) 40; *Thellung Monog. Lepidium* (1906) 314.

South Island: Otago—Saline situations in the Maniototo Plains, *Petrie!* December–January.

An exceedingly well marked little plant, not closely allied to any other.

T. 40 : 107 : 172.

5. **L. flexicaule** *T. Kirk in Trans. N.Z. Inst.* xiv (1882) 380.—Perfectly glabrous, smooth and fleshy. Stems numerous, branched, flexuous, procumbent; branches ascending at the tips. Lower leaves 2–3 in. long, petiolate, linear-oblong, pinnatifid; lobes 2–6 pairs, entire or toothed at the tips. Cauline leaves smaller, sessile or shortly petiolate, linear-spathulate or cuneate, coarsely toothed towards the apex. Racemes 1–2 in. long, lateral or terminal, leaf-opposed. Flowers small. Petals linear, obtuse. Stamens 2. Fruiting-pedicels rather longer than the pod. Pod broadly ovate, slightly winged above, notched at the apex; style not exceeding the notch.—*Students' Fl.* (1899) 35; *Cheesem. Man. N.Z. Fl.* (1906) 40. L. incisum *Banks and Soland. ex Hook. f. Fl. Nov. Zel.* i (1853) 14 (*not of Roth.*). Nasturtium neozelandicum *O. Kuntze Revis.* i (1891) 937.

North Island: Auckland—Mercury Bay, *Banks* and *Solander!* shores of the Manukau and Waitemata Harbours, *T. Kirk! T. F. C.*; Rangitoto Island, *T. F. C.* South Island: Near Westport, *W. Townson!* November–January.

This appears to be an exceedingly local plant, and is fast becoming extinct in the few habitats at present known. It is well characterized by the procumbent habit, lateral racemes, and diandrous flowers.

6. **L. tenuicaule** *T. Kirk in Trans. N.Z. Inst.* xiv (1882) 381.—More or less clothed with minute soft whitish hairs, rarely glabrous. Stems numerous, slender, branched, procumbent or suberect, 6–12 in. long. Radical leaves numerous, thin, 1–4 in. long, linear-oblong, pinnate or pinnatifid;

leaflets sometimes stalked, finely and sharply serrate or laciniate on the upper edge ; teeth irregular, sometimes piliferous ; petiole sheathing at the base. Cauline leaves usually few, sometimes absent, oblong-spathulate to linear, sessile or shortly petiolate, entire or serrate. Flowers very numerous, minute, in long and slender terminal racemes. Petals wanting. Stamens 4. Pod very small, orbicular, shorter than the slender pedicel, winged above, minutely notched ; style scarcely longer than the notch.—*Students' Fl.* (1899) 37 ; *Cheesem. Man. N.Z. Fl.* (1906) 40 ; *Thellung Monog. Lepidium* (1906) 315. T. S7.(1926) 83.

Var. **minor** *Cheesem. in Trans. N.Z. Inst.* xliii (1911) 175.—Small, depressed, thick and fleshy, seldom more than an inch or so in height.

North Island : Both the type and var. *minor* on Kapiti Island, off Cook Strait, *B. C. Aston !* The var. also occurs on the gravel beach of Titahi Bay, near Wellington. South Island : Usually near the sea ; Oamaru, Hampden, Awamoko, Weston, Orepuki, *Petrie !* Cape Whanbrow, Awamoa, Dog Island, Ruapuke, *T. Kirk !* Waipapa Point, *Cockayne.* Abundant on gravelly beaches in Southland, *Crosby Smith.* November–January.

A distinct but highly variable species, easily recognized by the minute orbicular pods. Mr. Kirk's var. *australe,* which he first published as a species (*Trans. N.Z. Inst.* xiv (1882) 381) but afterwards reduced to the position of a variety, appears to me to be a mere state with the stems more erect than usual and with much more numerous cauline leaves.

7. **L. Kawarau** *Petrie in Trans. N.Z. Inst.* xvii (1885) 270.—Dioecious, erect or diffuse, glabrous or slightly hairy, 6–12 in. high or more. Stems leafy, much branched above. Radical leaves numerous, 3–5 in. long, linear-oblong, pinnatifid or pinnate with a broad rhachis ; leaflets rather distant, linear, entire or with 1–3 linear lobes on the upper edge, rarely on the lower as well ; petioles sheathing at the base. Cauline leaves many, lower like the radical but sessile, gradually passing into the uppermost, which are narrow-linear, entire. Racemes very numerous at the ends of the branches, forming a much-branched panicle. Flowers small. Petals apparently wanting in both sexes. Stamens 4–6. Fruiting-pedicels spreading or ascending, rather longer than the pods. Pods ovate or ovate-oblong, notched at the apex ; style slightly exceeding the notch.—*T. Kirk Students' Fl.* (1899) 36 ; *Cheesem. Man. N.Z. Fl.* (1906) 41. L. sisymbrioides *subs.* Kawarau *Thellung Monog. Lepidium* (1906) 314.

Var. **dubium** *T. Kirk l.c.*—Taller, much more hairy, almost scabrid ; branches few, long, lax. Cauline leaves shorter and broader, pinnatifid. Petals present in the male flowers.

South Island : Otago—Kawarau River, Cromwell, *Petrie !* Var. *dubium :* Near Duntroon, *Petrie !* November–December.

Allied to *L. Matau,* with which it entirely agrees in the flowers and pods. It differs in the greater size, branched leafy habit and almost glabrous leaves, which are much larger and have long and narrow toothed pinnae. The var. *dubium* has a distinct appearance, but barely seems entitled to specific rank. Thellung, in his monograph of the genus, reduces both the species and the variety, together with *L. Matau,* to the well-known *L. sisymbrioides,* a view with which I cannot concur.

8. **L. Matau** *Petrie in Trans. N.Z. Inst.* xix (1887) 323.—Dioecious, erect, hoary with short scabrid hairs, 2–5 in. high. Root stout, woody. Stems one or several from the root, stout, somewhat strict, branched above. Radical leaves numerous, coriaceous, scabrid, 1–2 in. long, linear or linear-oblong, deeply pinnatifid or almost pinnate ; segments rounded or oblong,

rarely linear, entire or lobed on the upper edge. Cauline leaves oblong or ovate, sessile, usually entire. Flowers small, in short and dense racemes at the ends of the branches. Petals wanting in both sexes. Stamens 4. Fruiting-pedicels patent or slightly decurved, rather longer than the pods. Pods ovate, not winged, shortly notched above; style short, slightly exceeding the notch.—*T. Kirk Students' Fl.* (1899) 36; *Cheesem. Man. N.Z. Fl.* (1906) 41.

South Island: Otago—Alexandra South, Gimmerburn, *Petrie!* November–December.

Best recognized by the strict habit, scabrid and coriaceous leaves, short dense racemes, and apetalous dioecious flowers.

9. **L. sisymbrioides** *Hook. f. Handb. N.Z. Fl.* (1864) 14.—Dioecious, pubescent or almost glabrous, suberect, 2–5 in. high. Root stout and woody, often as thick as the finger, very long and tapering, much divided at the top. Leaves nearly all radical, numerous, crowded, spreading, 1–2 in. long, linear or linear-oblong in outline, deeply pinnatifid; segments many, small, short, entire or lobulate on the upper edge; petioles flat, often dilated at the base. Flowering stems numerous, slender, branched, spreading or suberect, usually with a few small entire cauline leaves below, sometimes naked. Flowers small, in terminal racemes; males with 4 narrow petals or apetalous; females always apetalous. Stamens 4. Pod about ½ as long as the slender spreading pedicels, ovate-rhomboid, acute at both ends, slightly winged above, minutely notched; style exceeding the notch.—*T. Kirk Students' Fl.* (1899) 37; *Cheesem. Man. N.Z. Fl.* (1906) 42; *Ill. N.Z. Fl.* i (1914) t. 11. L. Solandri *T. Kirk in Trans. N.Z. Inst.* xiv (1882) 380. L. sisymbrioides *subs.* Solandri *Thellung Monog. Lepidium* (1906) 313. Nasturtium sisymbrioides *O. Knutz Revis.* i (1891) 937.

South Island: Canterbury—Broken River district, *Haast, J. D. Enys! T. Kirk! T. F. C., Cockayne;* Mackenzie Plains, *J. F. Armstrong;* Lakes Tekapo and Pukaki, *T. F. C.;* Lake Ohau, *Haast.* Otago—Waitaki Valley and Lake Wanaka, *Buchanan!* Kurow, *Petrie!* Altitudinal range 500–3000 ft. December–January.

I regard this as a distinct species, at once separated from the two preceding by the more depressed habit, lax racemes, and ovate-rhomboid pods; and I cannot at all agree with Dr. Thellung in combining the three into one species.

It should be mentioned that the stout cylindric root often descends for distances altogether out of proportion to the short stems. On one occasion Mr. Enys showed me specimens nearly 4 ft. in length.

7. **NOTOTHLASPI** Hook. f. 1862.

Small fleshy simple or branched alpine herbs, glabrous or slightly hairy. Leaves all radical, or radical and cauline, spathulate, petiolate. Flowers rather large, white, densely crowded in a terminal raceme, or corymbose at the tips of the branches. Sepals erect, equal at the base. Petals spathulate. Pods rather large, obovate or oblong, much compressed, valves very broadly winged. Seeds numerous in each cell, reniform, attached by slender long funicles. Cotyledons incumbent; radicle often very long.

A genus of two species, both confined to the mountains of the South Island. It is remarkable for its very numerous seeds, and long capillary funicles.

Stem simple. Flowers densely crowded on a stout terminal peduncle or scape. Style very short .. .. 1. *N. rosulatum.*

Stem usually much branched. Flowers corymbose at the ends of the branches. Style long .. .. 2. *N. australe.*

L. sisymbrioides Hook.f.
(according to Shellung's arrangement)

1. Folia caulina reducta. Ssp. Solandri (Kirk) Shell.
   (a) var.L typicum Shell. Silicate manifesto shombica, stylo brevita exserto.
   (b) var.B ovatum Shell. Silicate late ovato-rehontrica, stylo disracte exserto.

Folia caulina conspicua . . . . . 2.

2. Caulis superne dense ramosus; foliorum basilarium pinnulae rotundatae, salpe integrae - ssp. Matau (Petrie) Shell.
   (a) var. lobulatum Shell. Foliorum basilarium pinnulae subpinnati - lobatae lobulis obnisis rotundatis.

Caulis laxe ramosus ramis magis. patentilus - Ssp. Kawarau (Petrie) Shell.
   var. dubium T. Kirk.

Ssp. Solandri
   var. ovatum - East coast of Otago and Kurow.
Ssp. Matau
   var. lobulatum - Maniototo Plain.
Ssp. Kawarua
   var. dubium - "Earthquake near Duntroon".

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south than Lake Tennyson.

Family XLV. **DROSERACEAE.**

Herbs, rarely undershrubs. Leaves alternate, often rosulate, stipulate, usually furnished with glandular irritable hairs ; vernation circinate. Flowers regular, hermaphrodite. Calyx 4–5-partite or divided into 4–5 free sepals, imbricate, persistent. Petals the same number, hypogynous, rarely perigynous, free or sometimes connate at the base. Stamens 4–5, rarely more, hypogynous or perigynous, rarely epipetalous. Ovary free or nearly so, 1–3-celled ; styles 1–5, simple or bifid or multifid ; ovules numerous, attached

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Fl. (1906) 41

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rather large, white, densely crowded in a terminal raceme, or corymbose at the tips of the branches. Sepals erect, equal at the base. Petals spathulate. Pods rather large, obovate or oblong, much compressed, valves very broadly winged. Seeds numerous in each cell, reniform, attached by slender long funicles. Cotyledons incumbent ; radicle often very long.

A genus of two species, both confined to the mountains of the South Island. It is remarkable for its very numerous seeds, and long capillary funicles.

Stem simple. Flowers densely crowded on a stout terminal peduncle or scape. Style very short .. .. 1. *N. rosulatum.*
Stem usually much branched. Flowers corymbose at the ends of the branches. Style long .. .. 2. *N. australe.*

1. **N. rosulatum** *Hook. f. Handb. N.Z. Fl.* (1864) 15.—A very remarkable stout erect leafy pyramidal fleshy herb 3–9 in. high, stem very short or almost wanting. Leaves all radical, very numerous, most densely crowded, fleshy, imbricated, forming a rosette or cushion, spathulate, crenate or dentate, when young clothed with white cellular ribband-like hairs, glabrous or nearly so when old, narrowed into a petiole of variable length. Scape very stout, sometimes as thick as the finger, covered with densely crowded sweet-scented flowers, forming a conical or pyramidal raceme. Pods ½–1 in. long, obovate, very broadly winged, notched at the top; style very short; stigma 2-lobed. Seeds numerous, subreniform, pitted; radicle very long, twice folded, first upwards then downwards and backwards over the back of the cotyledons.—*T. Kirk Students' Fl.* (1899) 38; *Cheesem. Man. N.Z. Fl.* (1906) 42. N. notabile *Buch. in Trans. N.Z. Inst.* xiv (1882) 344, t. 25.

var. *linnsthomii* Petrie 1925. 56: 11.

South Island: Nelson and Canterbury—Not uncommon on dry shingle-slopes on the mountains, but easily overlooked. Wairau Gorge, *Maling, W. T. L. Travers;* Gordon's Knob, Raglan Mountains, Wairau Gorge, Lake Tennyson, Mount Torlesse, mountains above the Broken River, *T. F. C.;* Wairau Gorge, Porter's Pass, Leith Hill, *T. Kirk!* Mount Franklin, *Buchanan!* Craigieburn Mountains, *Cockayne!* Mount Arrowsmith, *R. M. Laing* and *Cockayne;* Waimakariri Valley, *Haast!* Otago—Mount Ida, *P. Goyen!* Altitudinal range 2500–6000 ft. December–February.

One of the most singular plants in the Dominion. When in flower or fruit it has a conical or pyramidal shape; but flowerless specimens form rosettes or cushions of closely packed imbricating leaves, from which, no doubt, has arisen the local name of "penwiper plant." The flowers are deliciously fragrant.

2. **N. australe** *Hook. f. Handb. N.Z. Fl.* (1864) 15.—Small, densely tufted, usually much branched from the base; branches leafy, spreading, 1–4 in. long. Leaves radical and cauline, numerous, ½–1½ in. long, petiolate, linear- or oblong-spathulate, entire or crenate, glabrous or with a few cellular hairs, often recurved. Flowers very numerous, corymbose, about ¼ in. diam. Pod much smaller than in the preceding species, ⅓–½ in. long, broadly oblong or elliptic, winged, barely notched at the top; style long, almost ⅓ the length of the pod. Seeds numerous, pitted; radicle long, slender.—*T. Kirk Students' Fl.* (1899) 38; *Cheesem. Man. N.Z. Fl.* (1906) 43; *Ill. N.Z. Fl.* i (1914) t. 12. Thlaspi (?) australe *Hook. f. Fl. Nov. Zel.* ii (1855) 325.

Var. **stellatum** *T. Kirk l.c.* 39. — Stems not branched. Leaves narrow linear-spathulate; petioles pubescent. Flowers numerous, on long 1-flowered peduncles.

South Island: Nelson—An abundant plant on the mountains, from 2500 to 5000 ft. Var. *stellatum:* Mount Rintoul, *F. G. Gibbs, W. H. Bryant.* T. 71 (1941) 86

A pretty little plant, originally discovered by Sir David Monro. Although very common in the Nelson and Marlborough Districts, it has not been observed further south than Lake Tennyson.

Family XLV. **DROSERACEAE.**

Herbs, rarely undershrubs. Leaves alternate, often rosulate, stipulate, usually furnished with glandular irritable hairs; vernation circinate. Flowers regular, hermaphrodite. Calyx 4–5-partite or divided into 4–5 free sepals, imbricate, persistent. Petals the same number, hypogynous, rarely perigynous, free or sometimes connate at the base. Stamens 4–5, rarely more, hypogynous or perigynous, rarely epipetalous. Ovary free or nearly so, 1–3-celled; styles 1–5, simple or bifid or multifid; ovules numerous, attached

to parietal placentas equalling the styles in number. Capsule membranous, loculicidally 3–5-valved; seeds numerous, albuminous; embryo straight, axile.

A small family, comprising 6 genera and about 120 species, distributed over the whole world with the exception of Polynesia, but most abundant in Australia. The whole of the species capture insects, usually by means of glandular viscid and irritable hairs; but in some cases, as the well-known Venus's fly-trap (*Dionaea muscipula*) by rapidly closing laminae, which shut the insects as it were in a box. For a full account reference should be made to Mr. Darwin's well-known book on "Insectivorous Plants." The single New Zealand genus is the largest in the family, and has an almost world-wide distribution.

see Diels for key

DROSERA Linn. 1735.

Herbs, either scapigerous or with a leafy stem. Leaves rosulate or alternate, covered with numerous hair-stalked glands which secrete a drop of transparent viscid fluid. Stipules wanting or adnate to the base of the petiole. Flowers solitary or in terminal often one-sided racemes or cymes. Calyx 4–5-partite. Petals 4–5, hypogynous or rarely perigynous, marcescent. Stamens the same number. Ovary ovoid or globose, 1-celled; styles 2–5, free or connate below; ovules numerous, on 2–5 parietal placentas. Capsule oblong, 2–5-valved. Seeds minute; testa lax.

Species about 100, scattered over the whole world, but most abundant in Australia. Of the 6 found in New Zealand, 1 is endemic, the remaining 5 extend to Australia.

* Scape 1-flowered.

Leaves spathulate. Calyx-lobes short, rounded. Styles 3, multifid	1. *D. stenopetala.*
Leaves linear-ligulate. Calyx-lobes long, linear-oblong. Styles 3; stigmas capitate	2. *D. Arcturi.*
Minute. Leaves rosulate, orbicular. Styles 4; stigmas clavate ..	3. *D. pygmaea.*

** Scape several- or many-flowered.

Leaves rosulate, spathulate. Styles 3, 2-partite	4. *D. spathulata.*
Leaves long, very narrow-linear, forked or dichotomous	5. *D. binata.*
Stem leafy. Leaves lunate, peltate. Flowers pink. Styles 3, penicillate	6. *D. auriculata.*

1. **D. stenopetala** *Hook. f. Fl. Nov. Zel.* i (1853) 19, t. 9.—Stemless; rootstock short, stout. Leaves 1–4 in. long or more; petioles slender, flat, perfectly glabrous; blade $\frac{1}{4}$–$\frac{3}{4}$ in., spathulate, the margins and upper surface densely covered with long glandular hairs. Scape 1–6 in. long, exceeding the leaves, slender, glabrous, 1-flowered. Flowers $\frac{1}{3}$ in. diam., white. Calyx broadly campanulate, 5-lobed, glabrous; lobes short, rounded. Petals linear-spathulate; claw very long and narrow. Styles 3, multifid almost to the base.—*Handb. N.Z. Fl.* (1864) 63; *T. Kirk Students' Fl.* (1899) 145; *Cheesem. Man. N.Z. Fl.* (1906) 145.

North Island: Ruahine Mountains, *Herb. Colenso! W. F. Howlett, B. C. Aston!* Tararua Mountains *Buchanan! B. C. Aston!* Mount Holdsworth, *W. Townson!* Mount Hector, *Petrie!* South Island: Not uncommon in the higher central and western mountains, from the Mount Arthur Range southwards. Stewart Island: Not uncommon, *Petrie, T. Kirk! Cockayne!* Auckland and Campbell Islands: *Hooker, T. Kirk! Cockayne, J. S. Tennant!* Altitudinal range 3500–5000 ft. in the North Island, but descends to comparatively low levels in the south-west of the South Island, and almost to sea-level in Stewart Island and the Auckland Islands.

2. **D. Arcturi** *Hook. in Journ. Bot.* i (1834) 247.—Stemless. Rootstock short or 1–2 in. long, clothed with the ragged bases of the old leaves. Leaves 1–4 in. long, erect, linear-ligulate, obtuse, upper portion covered with

glandular hairs, lower half glabrous ; petiole almost as broad as the blade ;

DROSERA: Dielsian Arrangement

1. RORELLA: Unterird. Steng. nicht verdickt. Stip. meist deut. griffel ungeteilt oder 2-get., selten mehrmals gabelig - geteilt.

1. Psychophila: Bl. am. Grunde scheidig - verbreit., Nebenbl.klein oder fehlend; Blattst. spately in die Spreite umbergehend. Steng. meist. einblutig. Griff.3, oft am grunde 2-teil., vorn verbreit, oder nodmals get.
Arcturi - calyx-lobes long, linear-obkong
stenopetala - calyx-lobes short, rounded.

2. Bryastrum: Sterig. sehr kurz, Bl. rosettig; stip. trocken-hautig; spreite axzent. schildformig. Blutenochaft einth., guffel 4, ungeheilt. - pygmaea.

7. Rossolis: Bl. meist rosettig-gehauft Stip. trock-haut., selten verkum.; Blattst. meist ausgebild.; spreik unget. Griffel 3, von grund am zweiteilig. - spathulata.

9. Phycopsis: Blattsp. in 2 einfact oder 2- bis 4- spaltige schenkel get., griffel mebrfach-zweiteilig. - binata.

11. ERGALEIUM: Stengel unter der Erde zivesbel-tragend. Stipeln meist fellerd. Griffel meist dichotom-vielteilig.

Auriculata.

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Leaves spa... Leaves line... stigmas ... Minute. I...

** Sca...

Leaves ros... Leaves lon... Stem leaf... penicilla...

1. **D.** ... rootstock ... flat, perf... surface ... exceedin... white. ... Petals li... almost t... (1899) 1...

Nor... Tararua ... Mount H... western ... Not unc... *Hooker*, ... North Isl... Island, a...

2. **I** ... short or... 1–4 in.

glandular hairs, lower half glabrous; petiole almost as broad as the blade; early leaves shorter and broader, sometimes quite glabrous. Scape 2–6 in. high, slender, 1-flowered or very rarely 2-flowered. Flowers $\frac{1}{3}$ in. diam., white. Calyx divided almost to the base; lobes 4, linear-oblong. Petals oblong or obovate, slightly exceeding the calyx. Styles 3–4, short; stigmas broad.—*Ic. Plant.* (1836) t. 56; *Hook. f. Fl. Nov. Zel.* i (1853) 20; *Fl. Tasm.* i (1860) 28; *Handb. N.Z. Fl.* (1864) 63; *Benth. Fl. Austral.* ii (1864) 466; *T. Kirk Students' Fl.* (1899) 145; *Cheesem. Man. N.Z. Fl.* (1906) 145; *Ill. N.Z. Fl.* i (1914) t. 45A; *Diels in Pflanzenr.* Heft 26 (1906) 63, t. 21. D. polyneura *Col. in Trans. N.Z. Inst.* xxii (1890) 460. D. Ruahinensis *Col. l.c.* xxviii (1896) 593. D. ligulata *and* D. atra *Col. l.c.* xxxi (1899) 269.

North Island: Mountain-bogs at high levels around Tongariro, Ngauruhoe, and Ruapehu, *Petrie! T. F. C., Cockayne;* Ruahine and Tararua Mountains, *Colenso! Olsen! B. C. Aston!* South Island, Stewart Island: Abundant in mountain-bogs throughout. Altitudinal range usually from 2000 to 5000 ft., but descends almost to sea-level on Stewart Island. Also not uncommon in the higher mountain districts of New South Wales, Victoria, and Tasmania.

3. **D. pygmaea** *DC. Prodr.* i (1824) 317.—A very minute stemless species forming flat rosettes $\frac{1}{3}$–$\frac{1}{2}$ in. diam. Leaves numerous, densely crowded; petioles short, slender; limb $\frac{1}{20}$–$\frac{1}{15}$ in. diam., upper surface covered with glandular hairs; stipules large, scarious, deeply lobed, forming a beautiful silvery cone in the centre of the rosette. Scapes 1–4, glabrous, filiform, $\frac{1}{2}$–$\frac{3}{4}$ in. high, 1-flowered. Flowers minute, white. Calyx 4-lobed. Petals slightly longer than the calyx. Styles 4, short, clavate. Capsule oblong, 4-valved.—*Hook. f. Fl. Nov. Zel.* i (1853) 20; *Handb. N.Z. Fl.* (1864) 63; *Benth. Fl. Austral.* ii (1864) 457; *T. Kirk Students' Fl.* (1899) 146; *Cheesem. Man. N.Z. Fl.* (1906) 145; *Ill. N.Z. Fl.* i (1914) t. 46B; *Diels in Pflanzenr.* Heft 26 (1906) 65, t. 22.

North Island: In moist peaty swamps. Near Cape Maria van Diemen, *Colenso!* Te Paua, Parengarenga Harbour, *T. F. C.;* Ahipara, *H. Carse* and *R. H. Matthews!* peaty localities at Waimarino, *E. Phillips Turner!* South Island: Bluff Hill, *T. Kirk!*

A beautiful little plant, probably not uncommon in most peaty situations, but easily overlooked. It is not uncommon in south-eastern Australia and Tasmania.

4. **D. spathulata** *Lab. Nov. Holl. Pl.* i (1804) 79, t. 106, f. 1.—Stemless. Leaves numerous, crowded, rosulate, $\frac{1}{3}$–$\frac{3}{4}$ in. long; blade $\frac{1}{8}$–$\frac{1}{3}$ in., spathulate or obovate or orbicular-obovate, narrowed into a broad and flat petiole of varying length, upper surface and margins covered with glandular hairs; stipules scarious, narrow, laciniate. Scapes 1 or several, 1–6 in. high, usually bearing a secund raceme of 3–7 flowers, but often 2–3-flowered or even 1-flowered. Flowers small, $\frac{1}{5}$ in. diam., white or rose. Calyx deeply divided; lobes 5, linear-oblong. Petals 5, rather longer than the calyx. Styles 3, 2-partite almost to the base, branches entire or again forked.—*Hook. f. Fl. Nov. Zel.* i (1853) 20; *Handb. N.Z. Fl.* (1864) 63; *Benth. Fl. Austral.* ii (1864) 459; *T. Kirk Students' Fl.* (1899) 146; *Cheesem. Man. N.Z. Fl.* (1906) 146. D. propinqua *R. Cunn. Precur.* (1838) n. 620. D. minutula *Col. in Trans. N.Z. Inst.* xxi (1889) 81. D. triflora *Col. l.c.* xxii (1890) 461.

North and South Islands, Stewart Island: From Mangonui southwards, but often local. Sea-level to 4500 ft. November–January. Also in Australia and Tasmania.

Mountain specimens are often much reduced in size, with shorter and broader leaves, 1–2-flowered scapes, and broader calyx-lobes; but they pass by insensible gradations into the ordinary form.

5. **D. binata** *Lab. Nov. Holl. Pl.* i (1804) 78, t. 105, f. 1.—Stemless. Rootstock short, emitting numerous fleshy roots. Leaves all radical, erect; petioles 2–5 in. long, slender, glabrous; blade 2–4 in., divided to the base into 2 narrow-linear segments $\frac{1}{15}$–$\frac{1}{10}$ in. broad, which are simple or again forked, upper surface and margins clothed with long glandular hairs. Scapes exceeding the leaves, 6–18 in. high, slender, glabrous, bearing a loose cyme of few or many rather large white flowers $\frac{1}{3}$–$\frac{1}{2}$ in. diam. Calyx deeply 4–5-lobed; lobes oblong, entire or lacerate at the tips. Petals 4–5, obovate, twice as long as the calyx. Styles usually 3, penicillate.—*Bot. Mag.* (1831) t. 3082; *Hook. f. Fl. Nov. Zel.* i (1853) 20; *Handb. N.Z. Fl.* (1864) 64; *Benth. Fl. Austral.* ii (1864) 461; *T. Kirk Students' Fl.* (1899) 146; *Cheesem. Man. N.Z. Fl.* (1906) 146; *Diels in Pflanzenr.* Heft 26 (1906) 105. D. intermedia *R. Cunn. Precur.* (1838) n. 621. D. flagellifera *Col. in Trans. N.Z. Inst.* xxiii (1891) 384. *D. cunninghamii* Walp. Rep. 299.

North and South Islands, Stewart Island: From the North Cape southwards. Sea-level to 2500 ft. November–February. A common Australian and Tasmanian plant.

A very handsome and conspicuous species. Mr. Colenso's *D. flagellifera*, as shown by the specimens in his herbarium, is merely a small state with narrower and often simple leaf-segments, and can be matched in any locality where the plant is plentiful.

6. **D. auriculata** *Backh. ex Planch. in Ann. Sci. Nat.* Ser. 3, ix (1848) 295.—Rootstock slender, terminating in a globose tuber deep in the ground. Stems leafy, erect, flexuose and wiry, simple or sparingly branched, perfectly glabrous, usually 6–18 in. high but sometimes much longer and almost climbing. Radical leaves rosulate, sometimes reduced to linear scales; blade orbicular or reniform, glandular; petiole short, broad, flat. Cauline leaves alternate, on longer filiform petioles, peltate; blade $\frac{1}{4}$ in. diam., broadly lunate, the two angles with glandular-ciliate appendages, margins fringed with long glandular hairs. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. diam., pink, in terminal 3–8-flowered racemes. Sepals 5, oblong, entire or minutely toothed. Petals twice as long as the sepals, obovate or obcordate. Styles 3, divided to below the middle into numerous dichotomous lobes.—*Hook. f. Fl. Nov. Zel.* i (1853) 21; *Handb. N.Z. Fl.* (1864) 64; *Benth. Fl. Austral.* ii (1864) 465; *T. Kirk Students' Fl.* (1899) 146; *Cheesem. Man. N.Z. Fl.* (1906) 146; *Diels in Pflanzenr.* Heft 26 (1906) 112. D. circinervia *Col. in Trans. N.Z. Inst.* xxvi (1894) 314. D. stylosa *Col. l.c.* xxviii (1896) 593.

North and South Islands: Abundant as far south as Banks Peninsula. Sea-level to 1500 ft. November–January. Also plentiful in Australia and Tasmania.

Family XLVI. **CRASSULACEAE.**

Succulent or fleshy herbs or undershrubs. Leaves opposite or alternate, generally simple; stipules wanting. Flowers regular, hermaphrodite or rarely unisexual. Calyx persistent, free, usually 3–5-fid or -partite. Petals as many as the sepals, free or more or less cohering into a lobed corolla, inserted at the base of the calyx. Stamens as many or twice as many as the petals, inserted with the petals and sometimes adnate to them. Ovary superior, of as many carpels as petals; carpels free or connate below, 1-celled, usually with a small gland or scale at the base of each; styles simple; ovules usually numerous, attached to the ventral suture

(few in *Tillaea*). Fruit of several 1-celled follicles, dehiscing along the ventral suture. Seed few or many, minute, albuminous; embryo terete, cotyledons short.

A rather large family, spread over the whole world except Polynesia. Particularly abundant in South Africa, where nearly half the species are found; also plentiful in the rocky districts of Europe and central Asia; rare in Australia and South America. Genera about 15; species estimated at 450. All the species are inert, and are of little importance from an economic point of view. The single New Zealand genus is almost cosmopolitan.

TILLAEA Linn.

Small and slender somewhat succulent glabrous herbs. Leaves opposite, entire. Flowers minute, axillary, solitary or fascicled, sometimes cymose. Calyx 3–5-lobed or -partite. Petals 3–5, free or connate at the base. Stamens the same number as the petals. Hypogynous scales 1 to each carpel or wanting. Carpels 3–5, narrowed into short styles; ovules 1 or more to each carpel. Follicles few- or many-seeded.

An almost cosmopolitan genus, comprising about 25 species. Two of those found in New Zealand also occur in Australia, and another in temperate South America, the Falkland Islands, and Kerguelen Island. Several of the New Zealand species are imperfectly known, and require careful study with recent specimens before satisfactory diagnoses can be prepared.

Schonland, in Engler and Prantl's "Pflanzenfamilien," reduces *Tillaea*, together with some other genera, to a section of *Crassula*. But this course has not received general acceptance; and as *Tillaea* undeniably constitutes a distinct group, and is retained as such by nearly all writers, and as there are no true *Crassulae* in the New Zealand Flora, it appears undesirable to make any change.

* A small scale at the base of each carpel.

Stems 2–7 in., red-brown. Leaves $\frac{1}{5}$–$\frac{1}{3}$ in., oblong-spathulate. Flowers large, $\frac{1}{6}$–$\frac{1}{5}$ in. diam. .. .. 1. *T. moschata.*

Stems 2–4 in., reddish. Leaves $\frac{1}{4}$–$\frac{1}{8}$ in., linear, acute. Flowers $\frac{1}{12}$–$\frac{1}{10}$ in. .. .. 2. *T. Helmsii.*

Stems 1–3 in., reddish, slender, matted. Leaves $\frac{1}{12}$–$\frac{1}{8}$ in., linear-oblong, obtuse. Flowers $\frac{1}{15}$ in. .. .. 3 *T. diffusa.*

Minute, delicate, matted, often less than 1 in. high. Leaves linear-oblong, fleshy, concave, $\frac{1}{20}$–$\frac{1}{12}$ in. Flowers white, $\frac{1}{15}$–$\frac{1}{12}$ in. 4. *T. Sinclairii.*

Prostrate and rooting, intricately branched, matted. Leaves thin, obtuse or subacute, $\frac{1}{15}$–$\frac{1}{12}$ in. Petals rather longer than the calyx .. .. 5. *T. pusilla.*

Prostrate and rooting, intricately branched. Leaves thin, acute or apiculate, $\frac{1}{15}$–$\frac{1}{10}$ in. Petals shorter than the calyx .. 6. *T. acutifolia.*

Stems decumbent and ascending, red-purple, $\frac{3}{4}$–2 in. Leaves ovate-subulate, fleshy, concave. Flowers $\frac{1}{10}$–$\frac{1}{8}$ in. Seeds 8 .. 7. *T. multicaulis.*

** No scales.

Stems erect, simple or branched, red-brown, 1–5 in. Leaves oblong, subacute, fleshy. Flowers minute, in dense leafy clusters .. 8. *T. Sieberiana.*

Stems delicate, intricately branched, prostrate, 2–3 in. Leaves linear-oblong, acute, $\frac{1}{16}$–$\frac{1}{12}$ in. Petals ovate-acuminate .. 9. *T. debilis.*

Minute, delicate, tufted, $\frac{1}{2}$–2 in. high. Peduncles slender, much elongated in fruit. Carpels many-seeded .. .. .. 10. *T. purpurata.*

T. Hamiltonii T. Kirk ex W. Hamilton in Trans. N.Z. Inst. xvii (1885) 292 is *Tetrachondra Hamiltonii* Petrie ex Oliv. in Ic. Plant. t. 2250 (family *Boraginaceae*).

1. **T. moschata** *DC. Prodr.* iii (1828) 382.—A small matted and tufted succulent red-brown herb; stems 2–7 in. long, prostrate and rooting below, erect or ascending at the tips. Leaves connate at the base, thick and fleshy, $\frac{1}{5}$–$\frac{1}{3}$ in. long, oblong-spathulate or linear-obovate or linear-oblong, obtuse. Flowers $\frac{1}{6}$–$\frac{1}{5}$ in. diam., axillary, solitary; peduncles short. Calyx

deeply 4-lobed; lobes obtuse, much shorter than the oblong obtuse petals. Scales 4, linear-cuneate, truncate at the tip. Carpels 4, turgid, obtuse; styles short, recurved. Seeds 6–8, rarely more.—*Hook. Ic. Plant.* (1842) t. 535; *Hook. f. Fl. Nov. Zel.* i (1853) 76; *Handb. N.Z. Fl.* (1864) 61; *T. Kirk Students' Fl.* (1899) 142; *Cheesem. Man. N.Z. Fl.* (1906) 140; *Ill. N.Z. Fl.* i (1914) t. 44A. Bulliarda moschata *D'Urv. in Mem. Soc. Linn. Par.* iv (1826) 618; *Hook. f. Fl. Antarct.* i (1844) 13, *and* ii (1847) 278.

North Island: Shores of Cook Strait, from Cape Palliser to Cape Terawhiti. South Island: Queen Charlotte Sound, *Banks* and *Solander!* coast near Westport, *W. Townson!* Banks Peninsula, *J. B. Armstrong! Cockayne.* Otago—Cliffs on the eastern and southern shores, *Petrie! T. Kirk!* islands in Foveaux Strait, *Poppelwell.* Chatham Islands, Stewart Island, Auckland and Campbell Islands, Antipodes Islands, Macquarie Island: Abundant.

This is purely a coast plant, and is never seen far from the sea. It is also a native of Chile, Fuegia, Falkland Islands, Kerguelen Island, and Marion Island.

2. **T. Helmsii** (*T. Kirk*) *Students' Fl.* (1899) 142.—Stems numerous, often forming large intricate patches, slender, 2–6 in. long, prostrate at the base, ascending above, green or reddish-green. Leaves rather distant, $\frac{1}{8}$–$\frac{1}{5}$ in. long, linear, acute. Flowers $\frac{1}{12}$–$\frac{1}{10}$ in. diam., axillary, solitary, on peduncles shorter than the leaves. Calyx deeply 4-lobed; lobes ovate, acute. Petals $\frac{1}{3}$ longer than the calyx, ovate-oblong, subacute. Scales 1 at the back of each carpel, narrow linear-cuneate. Carpels 4, turgid, about as long as the calyx; styles short, recurved. Seeds 3–5.—*Cheesem. Man. N.Z. Fl.* (1906) 141.

South Island: West Coast—Karamea, *Spencer;* Westport, *W. Townson!* Greymouth, *R. Helms!* December–March.

Very near to the Australian *T. recurva* Hook. f., which, however, is a larger plant, with more pointed leaves, and with the calyx-lobes and petals decidedly acuminate. It is easily distinguished from *T. moschata* by the more slender habit, narrower acute leaves, and smaller flowers.

3. **T. diffusa** (*T. Kirk*) *in Trans. N.Z. Inst.* xxiv (1892) 424.—A slender much-branched matted plant forming broad reddish patches. Stems filiform, erect or prostrate, 1–3 in. long. Leaves in distant pairs, fleshy, connate at the base, $\frac{1}{12}$–$\frac{1}{8}$ in. long, linear-oblong, obtuse, concave above, convex beneath. Flowers minute, about $\frac{1}{15}$ in. diam., solitary, on very short axillary peduncles. Calyx-lobes 4, broadly oblong, obtuse. Petals equalling the calyx-lobes or rather longer, broadly oblong, obtuse. Scales 4, cuneate. Carpels ovoid; styles recurved. Seeds 2–4.—*T. Kirk Students' Fl.* (1899) 144; *Cheesem. Man. N.Z. Fl.* (1906) 141.

North Island: Wellington Heads, Miramar, *T. Kirk! B. C. Aston! T. F. C.,* and others. Stewart Island: *T. Kirk.*

Mr. Kirk states that the scales are absent, but I find them to be constantly present, although difficult to detect except in young flowers.

4. **T. Sinclairii** *Hook. f. Handb. N.Z. Fl.* (1864) 62.—A minute delicate creeping or erect usually matted plant, rarely more than 1 in. high except when growing in water, when the stems are often elongated, and the leaves larger. Leaves minute, closely placed or distant, connate at the base, $\frac{1}{20}$–$\frac{1}{12}$ in. long, linear or linear-oblong, acute or subacute, concave above, convex or almost keeled beneath. Flowers on short or long axillary peduncles, minute, $\frac{1}{15}$–$\frac{1}{12}$ in. diam., white. Calyx-lobes ovate-oblong, obtuse. Petals about twice as long as the calyx-lobes, oblong, obtuse. Scales 4, linear-cuneate. Carpels 4, turgid; styles oblique, slightly recurved.

Seeds 3–4, rarely more.—*T. Kirk Students' Fl.* (1899) 142; *Cheesem. Man. N.Z. Fl.* (1906) 141. T. novae-zelandiae *Petrie in Trans. N.Z. Inst.* xxv (1893) 142.

Var. **obtusa** *Cheesem. Man. N.Z. Fl.* (1906) 142.—Stems stouter, creeping, 1–2 in. long or more. Leaves longer, more acute. Flowers rather larger, petals rounded.—T. novae-zealandiae *var.* obtusa *T. Kirk l.c.*

North Island: Matata, Bay of Plenty, *Petrie!* South Island: Nelson to Southland, not uncommon in watery places. Sea-level to 3000 ft. Var. *obtusa*: Lake Waihola, Otago, *Petrie!*

This is an abundant plant in watery places in the South Island, particularly in mountain districts. It is exceedingly variable in most of its characters.

5. **T. pusilla** *T. Kirk Students' Fl.* (1899) 143.—Stems numerous, very slender and delicate, prostrate and rooting, 1–3 in. long, forming broad pale-green matted patches. Leaves minute, in distant pairs, connate at the base, $\frac{1}{15}$–$\frac{1}{10}$ in. long, linear or linear-lanceolate, obtuse or acute, spreading or reflexed, thin. Flowers minute, $\frac{1}{15}$ in. diam.; peduncles longer or shorter than the leaves. Calyx-lobes ovate-oblong, acute. Petals rather longer, acute or subacute. Stamens equalling the petals. Scales 4, linear-cuneate. Carpels 4, turgid; styles recurved. Seeds 2–4.—*Cheesem. Man. N.Z. Fl.* (1906) 142.

North Island: Muddy banks of the Northern Wairoa, *T. F. C.*; Kawakawa, Bay of Islands, *T. Kirk*; Wairoa Falls, Hunua, *T. Kirk! T. F. C.! Petrie!*

Distinguished from *T. Sinclairii* by the different habit, longer much-branched stems, more distant thin and pointed leaves, and shorter narrower petals.

6. **T. acutifolia** *T. Kirk Students' Fl.* (1899) 143.—Stems very slender, almost capillary, prostrate and rooting, much and intricately branched, forming pale-green matted patches. Leaves minute, in distant pairs, connate at the base, $\frac{1}{15}$–$\frac{1}{12}$ in. long, narrow-linear or linear-lanceolate, acute or apiculate, thin. Flowers minute, $\frac{1}{20}$–$\frac{1}{15}$ in. diam., on peduncles shorter than the leaves. Calyx deeply divided; segments linear-lanceolate, acuminate. Petals narrow-ovate, shorter than the calyx. Scales 4, minute. Carpels 4, ovoid, turgid; styles recurved. Mature seeds not seen.—*Cheesem. Man. N.Z. Fl.* (1906) 142.

North Island: Hurunuiorangi, *T. Kirk!* South Island: Winton Forest, Southland, *T. Kirk!*

This has precisely the habit of *T. pusilla*, but appears to differ in the narrower and more acute leaves, and in the calyx-lobes exceeding the petals. I have seen no specimens except those in Mr. Kirk's herbarium, which are few and incomplete.

7. **T. multicaulis** *Petrie in Trans. N.Z. Inst.* xix (1887) 324.—A minute slender much-branched reddish-purple plant; stems prostrate or decumbent below, ascending at the tips. Leaves opposite or in opposite fascicles, remote below, close-set and often imbricating above, connate at the base, $\frac{1}{15}$–$\frac{1}{12}$ in. long, ovate-subulate, acute or mucronate, fleshy, concave above, convex or keeled beneath. Flowers solitary, axillary, $\frac{1}{10}$–$\frac{1}{8}$ in. diam., white or rosy. Calyx-lobes ovate-subulate, acute. Petals 4, exceeding the calyx-lobes, broadly oblong, obtuse. Scales 4. Carpels 4, ovoid; style recurved. Seeds 8.—*T. Kirk Students' Fl.* (1899) 143: *Cheesem. Man. N.Z. Fl.* (1906) 142.

South Island: Canterbury—Mount Torlesse and Broken River basin, *J. D. Enys! T. Kirk! T. F. C.*; Lake Tekapo, *T. F. C.* Otago—Maniototo and Manuherikia Plains, *Petrie!* 1000–3000 ft. December–January. A well-marked plant.

C. Bruce 1916 (618)

8. **T. Sieberiana** (*Schultz*) *Mant.* iii (1771) 345.—A small pale reddish-brown succulent annual; stems 1–5 in. high, erect, simple or branched from the base. Leaves minute, $\frac{1}{10}$ in. long, connate at the base, ovate-oblong or linear-oblong, subacute, thick and fleshy, concave above, convex beneath. Flowers very minute, in dense axillary clusters mixed with small leaves, at first sessile, but the peduncles usually lengthen as the fruit ripens. Sepals 4, ovate-lanceolate, acuminate. Petals shorter and narrower, acute. Scales wanting. Carpels 4, linear-oblong, nearly equalling the sepals when ripe. Seeds usually 2.—*T. Kirk Students' Fl.* (1899) 143; *Cheesem. Man. N.Z. Fl.* (1906) 143; *Ill. N.Z. Fl.* i (1914) t. 44B. T. verticillaris *DC. Prodr.* iii (1828) 382; *A. Cunn. Precur.* (1839) n. 521; *Raoul Choix* (1846) 48; *Hook. f. Fl. Nov. Zel.* i (1853) 75; *Handb. N.Z. Fl.* (1864) 62; *Benth. Fl. Austral.* ii (1864) 451. T. muscosa *Forst. f. Prodr.* (1786) n. 61 (*non Linn.*); *A. Rich. Fl. Nouv. Zel.* (1832) 322.

North and South Islands: Abundant throughout, in dry rocky or gravelly places. September–January. Also common in Australia and Tasmania.

C.

9. **T. debilis** *Col. ex Hook. f. Fl. Nov. Zel.* i (1853) 75.—A very small delicate species; stems intricate, filiform or capillary, prostrate, 2–3 in. long. Leaves in scattered pairs, minute, $\frac{1}{16}$–$\frac{1}{12}$ in. long, ovate-oblong or linear-oblong. Flowers minute, 1 or 2 in the axils of the leaves, sessile or on slender peduncles. Sepals 4, oblong, subacute. Petals ovate-acuminate, shorter than the sepals. Scales wanting. Carpel ovate-lanceolate, 1- or 2-seeded.—*T. Kirk Students' Fl.* (1899) 143; *Cheesem. Man. N.Z. Fl.* (1906) 143.

North Island: East Coast, *Colenso!* Wellington—Happy Valley Beach, *B. C. Aston!*

A very imperfectly known species. I do not feel at all sure that Aston's specimens are identical with Colenso's, which are very scanty and imperfect.

C Domin.

10. **T. purpurata** (*Hook. f.*) *in Lond. Journ. Bot.* vi (1847) 472.—A very slender delicate and fugacious annual; stems 1–2 in. high, erect or suberect, sparingly branched. Leaves remote, connate at the base, $\frac{1}{10}$–$\frac{1}{6}$ in. long, linear, acuminate, concave above. Flowers minute, $\frac{1}{12}$ in. diam., on slender pedicels that elongate much in fruit. Calyx-lobes 4, ovate, obtuse or subacute. Petals 4, equalling the calyx, acuminate. Scales wanting. Carpels broadly oblong, obtuse. Seeds numerous, usually 10–15.—*Hook. f. Fl. Nov. Zel.* i (1853) 75; *Handb. N.Z. Fl.* (1864) 62; *Benth. Fl. Austral.* ii (1864) 451; *T. Kirk Students' Fl.* (1899) 144; *Cheesem. Man. N.Z. Fl.* (1906) 143.

North Island: Wellington—Cape Palliser, *Colenso.* South Island: Nelson—Wairau River bed and Awatere River, *J. H. Macmahon!* Otago—Lake Wanaka, near Pembroke, *Petrie!*

Also common in south-eastern Australia and Tasmania. The linear acuminate leaves, long pedicels, and many-seeded carpels at once separate it from all the other species found in New Zealand.

C. lonarensis (D.C.) Cand. Black Fl. S. Aust. p. 392. (Ed. 2).

Escalloniaceae.

Family XLVII. SAXIFRAGACEAE.

Trees, shrubs, and herbs. Leaves alternate or opposite, simple or compound, rarely stipulate. Flowers usually regular and hermaphrodite. Calyx free or adnate to the ovary; lobes 4–5, imbricate or valvate. Petals 4–5, rarely wanting, imbricate or valvate. Stamens as many or twice as many as the petals, rarely more, perigynous or epigynous, very rarely hypogynous. Disc usually present, very various in shape and size. Ovary free or more or less adnate to the calyx-tube, usually 2–5-celled with 2–5 axile or parietal placentas; styles as many as the cells, free or more or less united; ovules numerous, anatropous, erect or pendulous. Fruit usually capsular, rarely succulent and indehiscent. Seeds usually small, numerous; albumen generally copious, rarely absent; embryo terete, usually small.

A large and polymorphous family, very difficult to define. The herbaceous genera are mainly found in the temperate regions of the Northern Hemisphere, or the mountains of the tropics; the arborescent ones have their headquarters in South America or Australia, with a few outlying species in Africa or Asia. Genera about 70; species 650. The properties of the family are unimportant. Of the 3 genera found in New Zealand, *Carpodetus* and *Ixerba* are endemic and monotypic, while *Quintinia* extends to Australia. (*Donatia*, included in the family in the first edition of this work, I now place in *Stylidiaceae*, following the example of Milbraed in the Pflanzenreich.)

Flowers racemose, small. Petals imbricate. Ovary inferior ..	1. QUINTINIA.
Flowers panicled, large. Petals imbricate. Ovary superior ..	2. IXERBA. — Saxifr.
Flowers panicled, small. Petals valvate. Ovary inferior ..	3. CARPODETUS.

1. QUINTINIA A. DC. 1830.

Shrubs or trees. Leaves alternate, coriaceous, exstipulate. Flowers small, in axillary or terminal many-flowered racemes. Calyx-tube obconic, adnate to the ovary; teeth 5, persistent. Petals 5, imbricate, deciduous. Stamens 5, filaments subulate. Ovary inferior, 3–5-celled, the free summit broadly conical, narrowed into a persistent 3–5-grooved style; stigma capitate, 3–5-lobed; ovules numerous. Capsule small, inferior or half-superior, coriaceous, obovoid, 1-celled, 3–5-valved, the valves separating up the furrows of the style. Seeds numerous, ascending; testa loose, winged.

In addition to the two following species, which are endemic in New Zealand, there are three others in Australia.

Leaves 3–6 in., linear-lanceolate to oblong	1. *Q. serrata.*
Leaves 3–8 in., obovate or elliptic-oblong	2. *Q. acutifolia.*

1. **Q. serrata** *A. Cunn. Precur.* (1839) n. 515.—A small tree 15–30 ft. high; branchlets, leaves, and racemes covered with minute lepidote scales, viscid when young. Leaves coriaceous, yellow-brown or reddish-brown when dry, 2–6 in. long, linear-lanceolate or linear-oblong or oblong, shortly petiolate, remotely and irregularly sinuate-serrate, acute or sub-acute, margins undulate. Racemes 2–4 in. long, erect, strict, axillary, many-flowered; pedicels short, $\frac{1}{5}$ in. Flowers pale-lilac, $\frac{1}{4}$ in. diam. Capsule woody, $\frac{1}{5}$ in. long.—*Hook. Ic. Plant.* (1843) t. 558; *Raoul Choix* (1846) 47; *Hook. f. Fl. Nov. Zel.* i (1853) 78; *Handb. N.Z. Fl.* (1864) 137; *T. Kirk* 59. *Forest Fl.* (1889) t. 125; *Students' Fl.* (1899) 137; *Cheesem. Man. N.Z. Fl.* (1906) 135.

16*

A. Cunn. in Tayl. Ann. Nat. Hist. p. 356.

North Island: Common in forests from Mangonui to Taranaki and Hawke's Bay. Sea-level to 3500 ft. *Tawheowheo.* October–November.

Very variable in the size and shape of the leaves. On high mountain-ranges they become shorter, broader, and more obtuse, and the plant is then probably identical with Hooker's *Q. elliptica.* This is said to have elliptic or elliptic-lanceolate entire and obtuse leaves, and was collected in some locality on the east coast by Colenso.

2. **Q. acutifolia** *T. Kirk Students' Fl.* (1899) 137.—A small tree 20–40 ft. high, with a trunk 1–2 ft. diam. Branchlets, leaves, and racemes viscid and clothed with lepidote scales. Leaves much broader and thinner than in *Q. serrata*, 3–7 in. long, 1–2 in. broad, obovate or obovate-oblong or elliptic-oblong, rarely oblong- or elliptic-lanceolate, narrowed into a short stout petiole, acute or subacute, remotely and often obscurely sinuate-serrate. Racemes 2–4 in. long, always much shorter than the leaves. Flowers much as in *Q. serrata*, but filaments usually shorter. Capsule slightly larger.—*Cheesem. Man. N.Z. Fl.* (1906) 135. Q. serrata *var.* b *Hook. f. Handb. N.Z. Fl.* (1864) 59; *T. Kirk Forest Fl.* (1889) t. 125, f. 6, 7.

North Island: Little Barrier Island, *T. F. C.*; East Cape, *Bishop Williams!* South Island: West Coast, from Collingwood to Hokitika, *W. T. L. Travers, T. Kirk! R. Helms! T. F. C.*

An exceedingly puzzling plant. It is certainly connected by numerous intermediates with the typical state of *Q. serrata*, but its extreme forms appear much too distinct to admit of the two species being united. It is abundant on the Little Barrier Island, where the leaves attain an extreme length of 8 in. by a breadth of 2½ in. Southern specimens have smaller and more elliptic leaves.

2. IXERBA A. Cunn. 1839.

A small glabrous tree. Leaves opposite, alternate or whorled, exstipulate. Flowers white, in terminal panicles. Calyx-tube short, adnate to the base of the ovary; lobes 5, imbricate, deciduous. Petals 5, inserted beneath a 5-lobed disc, obovate, clawed, imbricate. Stamens 5, alternating with the lobes of the disc; filaments filiform. Ovary superior, conical, 5-lobed, 5-celled, narrowed into a subulate twisted 5-furrowed style; stigma acute; ovules 2 in each cell, collateral. Capsule coriaceous, broadly ovoid, 5-celled, loculicidally 5-valved; valves extending through the style, ultimately recurved, cohering below, 2-partite above. Seeds large, oblong, compressed, shining; funicle thick; embryo large; albumen very scanty.

A well-marked monotypic genus, confined to New Zealand.

1. **I. brexioides** *A. Cunn. Precur.* (1839) n. 580.—A small branching tree 20–50 ft. high, rarely more, with a trunk 1–2 ft. diam. Leaves 3–6 in. long, ⅓–1 in. broad, linear or linear-lanceolate, coriaceous, glabrous, acute or subacute, obtusely serrate; teeth tipped by a gland. Flowers large, 1–1½ in. diam.; pedicels jointed, silky. Calyx-lobes broadly ovate, silky. Capsule ¾ in. diam.—*Hook Ic. Plant.* (1842) tt. 577, 578; *Raoul Choix* (1846) 44; *Hook. f. Fl. Nov. Zel.* i (1853) 82; *Handb. N.Z. Fl.* (1864) 59; *T. Kirk Forest Fl.* (1889) t. 48; *Students' Fl.* (1899) 138; *Cheesem. Man. N.Z. Fl.* (1906) 136; *Ill. N.Z. Fl.* i (1914) t. 40.

North Island: Hilly forests from Ahipara and Maungataniwha to the northern part of Hawke's Bay. Ascends to 3000 ft. *Tawari.* November–December.

A very beautiful tree. Its handsome mode of growth, which has been compared with the northern *Arbutus*, its elegant foliage, and its conspicuous large white flowers,

often produced in great abundance, render it most attractive. It is one of the few trees for which the Maoris had a special name for the flowers alone, which they called *whakou*. In olden times they were strung into necklaces and garlands, and worn as personal adornments on gala-days and festivals. The wood is hard and dense, and probably durable.

3. **CARPODETUS** Forst. 1776.

A shrub or small tree. Leaves alternate, petiolate, exstipulate. Flowers small, white, in axillary and terminal cymose panicles. Calyx-tube turbinate, adnate to the ovary; lobes 5–6, small, deciduous. Petals 5–6, inserted under the margin of an epigynous disc, spreading, valvate. Stamens 5–6, inserted with the petals; filaments short, subulate; anthers oblong. Ovary inferior with a free rounded summit, 3–5-celled; style slender; stigma capitate; ovules numerous. Fruit globose, almost fleshy, indehiscent, girt round the middle by the cicatrix of the calyx-limb, 3–5-celled. Seeds numerous, small, pendulous; testa coriaceous, pitted; embryo very small; albumen fleshy.

The genus is limited to a single species, endemic in New Zealand.

1. **C. serratus** *Forst. Char. Gen.* 34 (1776) t. 17.—A shrub or small tree 15–30 ft. high, with a trunk 6–9 in. diam.; branches often flattened, spreading; young twigs, leaves, petioles, and inflorescence more or less pubescent. Leaves 1–2 in. long, ovate-oblong or elliptical, acute or obtuse, sharply and coarsely serrate, narrowed into a petiole $\frac{1}{4}$–$\frac{1}{2}$ in. long; in young plants often panduriform or irregularly lobed. Panicles broad, many-flowered, shorter than the leaves. Flowers $\frac{1}{5}$ in. diam., white, very abundantly produced. Capsule about the size of a small pea, black and shining when fully ripe.—*A. Rich. Fl. Nouv. Zel.* (1832) 366; *A. Cunn. Precur.* (1839) n. 575; *Hook. Ic. Plant.* (1843) t. 564; *Raoul Choix* (1846) 50; *Hook. f. Fl. Nov. Zel.* i (1853) 78; *Handb. N.Z. Fl.* (1864) 59; *T. Kirk Forest Fl.* (1889) t. 47; *Students' Fl.* (1899) 138; *Cheesem. Man. N.Z. Fl.* (1906) 137; *Ill. N.Z. Fl.* i (1914) t. 41. D.C. Prodr. 2: 79. Ann. Nat. Hist. 3: 247.

North and South Islands, Stewart Island: Not uncommon from the North Cape southwards; most plentiful in alluvial ground, by the banks of rivers, &c. Ascends to 3500 ft. *Piripiriwhata; Putaputaweta.* November–January.

Wood strong and tough, but not durable; sometimes used for axe-handles, &c.

Family XLVIII. **PITTOSPORACEAE.**

Trees or shrubs, rarely climbers. Leaves alternate or whorled, simple, seldom toothed or lobed, exstipulate. Flowers regular, hermaphrodite or more rarely unisexual, terminal or axillary. Sepals 5, free or connate at the base, imbricate. Petals 5, hypogynous, imbricate, often cohering at the base, limb spreading or recurved. Stamens 5, hypogynous, free; anthers versatile. Ovary normally 1-celled, with 2–5 parietal placentas, but often more or less completely 2–5-celled from the intrusion of the placentas; style simple; ovules usually numerous on each placenta. Fruit capsular or succulent and indehiscent. Seeds generally numerous; albumen copious; embryo minute, with the radicle next the hilum.

Genera 9; species about 120. The family is confined to Australia, with the exception of *Pittosporum* itself, which has a wide distribution in the warm regions of the Old World. Many of the species are more or less resinous and aromatic.

PITTOSPORUM Banks. 1788.

Trees or shrubs, glabrous or tomentose. Leaves alternate or subverticillate, usually entire, rarely sinuate-toothed or lobed. Flowers axillary or terminal, solitary or in fascicles, umbels, or corymbs. Sepals free or connate below. Petals 5, with erect claws, often connivent below; tips recurved. Stamens 5, erect; filaments subulate; anthers 2-celled, introrse. Ovary incompletely 2–4-celled; style short. Capsule globose, ovoid or obovoid, 1-celled; valves 2–4, hard and woody, bearing the placentas along the centre. Seeds immersed in a viscid fluid.

A genus of between 60 and 70 species, found in Africa, subtropical Asia, Australia, the Pacific islands, and New Zealand. All the New Zealand species are endemic, and most of them are confined to the North Island. The flowers are frequently polygamous or even unisexual.

A. Flowers axillary, solitary or fascicled; sometimes terminal, but in that case axillary flowers are present as well. (Flowers often strictly terminal in P. divaricatum.*)*

Leaves 1–2 in., obtuse or acute, thin, margins waved. Flowers solitary. Capsules ½ in. diam., valves thin .. .. .. 1. *P. tenuifolium.*

Leaves 2–3 in., acute, coriaceous, margins flat. Flowers usually solitary. Capsules ½ in. diam., valves thick and woody .. 2. *P. Colensoi.*

Flowers in axillary and terminal fascicles, otherwise as in *P. Colensoi* 3. *P. fasciculatum.*

Leaves 2–5 in., oblong-lanceolate, submembranous. Peduncles long, ⅔ in., 1–2-flowered. Capsules small, less than ½ in. diam.. 4. *P. Buchanani.*

Leaves 1½–2 in., oblong-obovate. Flowers axillary and terminal, solitary or fascicled. Capsules mostly terminal, large, ¾ in. diam. .. .. 5. *P. intermedium.*

Leaves large, 3–5 in., broadly oblong, covered with white floccose tomentum when young. Flowers axillary and terminal, solitary or fascicled. Capsules 2–3 in. diam. .. .. .. 6. *P. Huttonianum.*

Small rigid shrub. Leaves small, ⅓ in., obcordate. Flowers axillary, solitary or 2–3 together .. .. 7. *P. obcordatum.*

Small woody shrub. Leaves ¼–1 in., oblong or obovate. Flowers solitary and axillary, rarely terminal. Capsules small, ¼ in. .. 8. *P. rigidum.*

Hard and rigid shrub; branches interlaced and divaricating. Leaves polymorphous, oblong to linear, ½–¾ in. Flowers terminal or on short arrested axillary branchlets .. .. 9. *P. divaricatum.*

B. Flowers strictly terminal, in umbels or fascicles, rarely solitary.

Leaves elliptic-oblong or elliptic-obovate, 2–4 in., clothed with ferruginous tomentum. Capsules broadly ovoid, ⅔ in. diam., 2-valved .. .. 10. *P. ellipticum.*

Leaves linear or linear-oblong, entire, lobed, or pinnatifid. Umbels 4–8-flowered. Capsules ⅓ in. diam., globose, 2-valved .. 11. *P. patulum.*

Juvenile plant with divaricating branches. Adult leaves linear- or oblong-spathulate. Capsules ⅕–¼ in. diam. .. .. 12. *P. Turneri.*

Leaves elliptic-oblong or lanceolate, 1–2 in., often lobed or pinnatifid on young trees. Clothed with ferruginous tomentum. Capsules ½ in. diam., globose, 2-valved .. .. .. 13. *P. virgatum.*

Leaves linear-oblong, 1–1¾ in. long; young leaves as in *P. virgatum.* Capsules ⅔ in. long, subpyriform .. .. 14. *P. Matthewsii.*

Leaves oblong or oblong-obovate, 2–5 in., white beneath; margins flat. Capsules ⅔ in., 3-valved .. .. 15. *P. Ralphii.*

Leaves linear-obovate, 2–3 in., white or buff below, thick, margins recurved. Capsule tomentose, ¾–1¼ in. long, 3-valved .. 16. *P. crassifolium.*

Leaves elliptic-obovate, 2–3 in., glabrous when mature, margins flat. Capsules ¾–1 in., glabrous, 3–4-valved.. .. .. 17. *P. Fairchildii.*

Leaves obovate or oblong-lanceolate, glabrous. Umbels many-flowered. Capsules small, ½ in. diam., tetragonous or 4-lobed, 2-valved .. .. 18. *P. umbellatum.*

Leaves linear-obovate, 2–4 in., glabrous. Flowers yellow. Capsules large, elliptic-oblong, 1½ in. long, 2-valved .. .. 19. *P. Kirkii.*

Usually epiphytical. Leaves whorled, elliptic-lanceolate, 1½–2½ in. Capsules ½ in. diam. .. .. 20. *P. cornifolium.*
Small undershrub, 1–4 ft. Leaves linear or linear-oblong, ½–1½ in. long. Sepals and petals narrow-linear. Capsule ⅓ in. diam., beaked .. .. 21. *P. pimeleoides.*

C. Flowers in terminal compound umbels or corymbs.

Tree with white bark. Leaves elliptic, 2–4 in. Flowers yellow. Capsules small, ¼ in. diam. .. .. 22. *P. eugenioides.*
Tree 12–18 ft. high. Leaves elliptic-lanceolate, sharply serrate, 2–4 in. long. Flowers white, fragrant. Capsules ½ in. long, oblong-ovoid, apiculate, 2-valved .. .. 23. *P. Dallii.*

1. **P. tenuifolium** *Banks and Sol. ex Gaertn. Fruct.* i (1788–1807) 286, t. 59, f. 7.—A small tree 15–30 ft. in height, with a slender trunk and dark almost black bark; young leaves and branchlets usually pubescent, becoming glabrous when mature. Leaves alternate, 1–2½ in. long, oblong-ovate or elliptic-obovate, obtuse acute or shortly acuminate, quite entire, membranous or slightly coriaceous, margins undulate; petiole short. Flowers axillary, solitary or fascicled, ¼–½ in. long; peduncles about as long as the calyx, pubescent, straight or curved. Sepals oblong to ovate, obtuse or subacute, silky or glabrous. Petals dark-purple. Ovary silky. Capsule ½ in. diam., 3-valved, broadly obovoid or subglobose, downy when young,

closely allied to the preceding, but larger and more robust, with stouter branches. Leaves 2–4 in. long, oblong-lanceolate elliptic-oblong or obovate-oblong, acute, coriaceous, margins usually flat; petiole short, stout. Flowers axillary and solitary, rarely fascicled; peduncles short, erect or decurved, glabrous or pubescent; bracts not so caducous as in *P. tenuifolium*. Sepals broadly oblong, glabrous or subpescent. Capsule globose; valves thick and

Z. Fl. (1906) 53.
P. Huttonianum

Pittosporum colensoi, Hk.f.
See (Carse) T.N.Z.I.
vol. 60, p. 572-3.

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T 71 : 1941 : 86.

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3 new species of the genus Pittosporum described by Laing and Gourlay. T.N.Z.I. Vol. 65, p. 46.

P. crassicaule, (Chne.) Laing and Gourlay.
P. anomalum, Laing and Gourlay.
P. lineare, Laing and Gourlay.

Leaves elliptic-oblong or elliptic-obovate, 2–4 in., clothed with ferruginous tomentum. Capsules broadly ovoid, ⅔ in. diam., 2-valved .. .. 10. *P. ellipticum.*
Leaves linear or linear-oblong, entire, lobed, or pinnatifid. Umbels 4–8-flowered. Capsules ⅓ in. diam., globose, 2-valved .. 11. *P. patulum.*
Juvenile plant with divaricating branches. Adult leaves linear- or oblong-spathulate. Capsules ½–¾ in. diam. .. .. 12. *P. Turneri.*
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C. Flowers in terminal compound umbels or corymbs.

Tree with white bark. Leaves elliptic, 2–4 in. Flowers yellow. Capsules small, ¼ in. diam. .. .. 22. *P. eugenioides.*
Tree 12–18 ft. high. Leaves elliptic-lanceolate, sharply serrate, 2–4 in. long. Flowers white, fragrant. Capsules ½ in. long, oblong-ovoid, apiculate, 2-valved .. .. 23. *P. Dallii.*

1. **P. tenuifolium** *Banks and Sol. ex Gaertn. Fruct.* i (1788–1807) 286, t. 59, f. 7.—A small tree 15–30 ft. in height, with a slender trunk and dark almost black bark; young leaves and branchlets usually pubescent, becoming glabrous when mature. Leaves alternate, 1–2½ in. long, oblong-ovate or elliptic-obovate, obtuse acute or shortly acuminate, quite entire, membranous or slightly coriaceous, margins undulate; petiole short. Flowers axillary, solitary or fascicled, ¼–½ in. long; peduncles about as long as the calyx, pubescent, straight or curved. Sepals oblong to ovate, obtuse or subacute, silky or glabrous. Petals dark-purple. Ovary silky. Capsule ½ in. diam., 3-valved, broadly obovoid or subglobose, downy when young, glabrous and minutely rugose when old; valves rather thin.—*A. Cunn. Precur.* (1839) n. 615; *Raoul Choix* (1846) 48; *Hook. f. Fl. Nov. Zel.* i (1853) 21; *Handb. N.Z. Fl.* (1864) 19; *T. Kirk Forest Fl.* (1889) t. 46; *Students' Fl.* (1899) 47 (*in part*); *Cheesem. Man. N.Z. Fl.* (1906) 53. Trichilia monophylla *A. Rich. Fl. Nouv. Zel.* (1832) 306, t. 34 *bis.*

North and South Islands: Abundant from the North Cape to the Bluff. Altitudinal range from sea-level to 3000 ft. *Kohuhu.* October–November.

An abundant and variable plant, the best distinguishing characters of which are the small submembranous leaves with waved margins, axillary and usually solitary flowers, and small capsules with rather thin valves. The leaves are often pale-green, especially on young plants. The species is often used for garden hedges or breakwinds, for which it is eminently suitable.

2. **P. Colensoi** *Hook. f. Fl. Nov. Zel.* i (1853) 22.—A small tree, very closely allied to the preceding, but larger and more robust, with stouter branches. Leaves 2–4 in. long, oblong-lanceolate elliptic-oblong or obovate-oblong, acute, coriaceous, margins usually flat; petiole short, stout. Flowers axillary and solitary, rarely fascicled; peduncles short, erect or decurved, glabrous or pubescent; bracts not so caducous as in *P. tenuifolium.* Sepals broadly oblong, glabrous or pubescent. Capsule globose; valves thick and woody.—*Handb. N.Z. Fl.* (1864) 19; *Cheesem. Man. N.Z. Fl.* (1906) 53. P. tenuifolium *var.* Colensoi *T. Kirk Students' Fl.* (1899) 47. P. Huttonianum *var.* viridifolium *T. Kirk Students' Fl.* (1899) 47.

North and South Islands, Stewart Island: From Rotorua and the Patetere Plateau southwards, but often local. Ascends to 3500 ft. October–November.

Very closely allied to *P. tenuifolium,* and connected with it by numerous intermediates. Mr. Kirk unites the two, and there is much to be said in favour of such a course. But it must be admitted that *P. Colensoi,* with its stouter branches, much larger sharply pointed and more coriaceous deeper-green flat leaves, has a very distinct aspect from *P. tenuifolium;* so that, notwithstanding the intermediates, I am inclined to regard the differences between the usual states of the two plants as being too pronounced for varietal distinction alone, and I think that Kirk's *P. Huttonianum* var. *viridifolium* is simply a large-leaved form of *P. Colensoi.*

T 71 : 1941 : 86.

3. **P. fasciculatum** *Hook. f. Fl. Nov. Zel.* i (1853) 24.—A small tree 10–20 ft. high; bark black; branches spreading, glabrous. Leaves alternate, 2–4 in. long including the petiole, obovate-oblong or elliptic-oblong or lanceolate, obtuse or acute, narrowed into a short petiole, glabrous or the younger ones alone very slightly pubescent, coriaceous, dark-green above, paler beneath. Flowers densely fascicled in the upper axils or terminal; peduncles $\frac{1}{4}$–$\frac{1}{3}$ in. long, densely hoary tomentose, together with the linear bracts and ovate-lanceolate sepals. Petals linear-oblong, dark-purple. Capsule $\frac{1}{2}$–$\frac{2}{3}$ in. long, peduncle about the same length, usually decurved.—*Handb. N.Z. Fl.* (1864) 20. P. tenuifolium *var.* fasciculatum *T. Kirk in Trans. N.Z. Inst.* iv (1871) 262; *Students' Fl.* (1899) 47. P. Colensoi *var.* fasciculatum *Cheesem. Man. N.Z. Fl.* (1906) 53.

North and South Islands: Taupo, *Colenso!* volcanic plateau near Tongariro and Ruapehu, *T. Kirk, T. F. C.;* Awatere River, Marlborough, *H. J. Matthews!* Chalky Sound, *Lyall.* T. 72 (1942) 23.

It is with some hesitation that I replace Hooker's *P. fasciculatum* as a species. But it appears to me that such a course is inevitable unless both it and *P. Colensoi* are reduced to *P. tenuifolium*, a view which I am sure would not prove acceptable to the majority of New Zealand botanists. As it may be asked how far I am certain of the identity of my plant with Hooker's species, I may say that I hold one of Colenso's specimens of his *P. viride*, which Hooker selected as the type of *P. fasciculatum*. (See Fl. Nov. Zel. i (1853) p. 24.)

4. **P. Buchanani** *Hook. f. Handb. N.Z. Fl.* (1864) 725.—A shrub or small tree 10–20 ft. high, with slender spreading or ascending branches; young shoots and leaves silky-pubescent. Leaves alternate, 2–5 in. long, oblong or oblong-lanceolate or elliptic-oblong, rather membranous, acute or acuminate; margins flat, not waved; petioles slender. Peduncles axillary, solitary, slender, $\frac{1}{3}$–$\frac{2}{3}$ in. long, 1-flowered or rarely 2-flowered, glabrous or silky-pubescent. Sepals ovate-oblong, obtuse. Petals linear, dark-purple; claw long. Ovary silky. Capsule less than $\frac{1}{2}$ in. diam., subglobose, 3-valved, on long spreading peduncles.—*T. Kirk Students' Fl.* (1899) 47; *Cheesem. Man. N.Z. Fl.* (1906) 54.

North Island: Auckland—Kaitaia and Mangonui, *Buchanan!* Taranaki—Near Mount Egmont, *Hector!* Wellington—In several localities, *T. Kirk!*

This appears to be a rare and local species closely allied to *P. fasciculatum*, and chiefly separated from it by the longer and narrower leaves, long peduncles, narrower flowers, and smaller spreading capsules. I have seen no specimens except those quoted above, which are very poor and imperfect, and can offer no additional information to that given in the first edition of this work.

5. **P. intermedium** *T. Kirk in Trans. N.Z. Inst.* iv (1872) 266.—A small tree, in habit and foliage much resembling large specimens of *P. tenuifolium;* bark black; young shoots and leaves pubescent. Leaves $1\frac{1}{2}$–2 in. long, obovate or elliptic-obovate, obtuse or subacute, submembranous or slightly coriaceous, narrowed into rather long petioles; margins flat, not waved. Flowers both terminal and in the axils of the upper leaves, solitary or in 2–3-flowered clusters; peduncles short, pubescent. Sepals oblong, obtuse or subacute, silky. Capsules usually terminal, large, nearly $\frac{3}{4}$ in. diam., broadly ovoid or obovoid, downy, 2–3-valved; peduncles stout, decurved.—*Students' Fl.* (1899) 48; *Cheesem. Man. N.Z. Fl.* (1906) 54.

NORTH ISLAND: Auckland—Kawau Island, *T. Kirk!* October–November.

A puzzling plant, in habit and foliage not to be distinguished from large forms of *P. tenuifolium*, but the flowers are chiefly terminal and often fascicled, and the capsule is much larger, exactly matching that of *P. ellipticum*. Only one tree has been seen, and that was cut down several years ago. *P. ellipticum* is not known on Kawau Island or in the neighbourhood, or I should have felt tempted to have considered it as a hybrid between that species and *P. tenuifolium*.

6. **P. Huttonianum** *T. Kirk in Trans. N.Z. Inst.* ii (1870) 92.—A sparingly branched shrub or small tree 10–25 ft. high; bark black; young leaves and branches covered with white floccose tomentum, becoming glabrous when mature. Leaves alternate, 3–5 in. long, broadly oblong elliptic-oblong or obovate-oblong, obtuse or acute, coriaceous, flat; petioles $\frac{1}{2}$–$\frac{3}{4}$ in. long. Flowers either axillary and solitary or in 2–5-flowered axillary and terminal cymes; peduncles slender, covered with loose white tomentum. Sepals oblong or lanceolate, acute, tomentose. Petals ligulate, sharply recurved. Ovary silky. Capsules larger than in *P. tenuifolium*, $\frac{3}{4}$ in. diam., globose or broadly obovoid, 3-valved, rarely 2-valved, downy or nearly glabrous.—*Students' Fl.* (1899) 48; *Cheesem. Man. N.Z. Fl.* (1906) 54.

NORTH ISLAND: Great and Little Barrier Islands, *T. Kirk!* Cape Colville Peninsula, from Cabbage Bay to Ohinemuri, *T. Kirk! T. F. C., Adams!* October–November. Sea-level to 1500 ft.

Varies much in the number and position of the flowers, which may be either solitary or axillary, or collected into few-flowered cymes, which are then mostly terminal. In the latter case there is little to separate the species from states of *P. fasciculatum*, with the exception that *P. Huttonianum*, in the flowering season, always has the leaves, young branches, and inflorescence more or less clothed with white floccose tomentum, whereas *P. fasciculatum* has glabrous leaves and branches, and the rather scanty tomentum on the inflorescence cannot be described as white and floccose.

Ann. Sc. Nat. 1844 : 121.

7. **P. obcordatum** *Raoul Choix* (1846) 24, t. 24.—A shrub or small tree 6–15 ft. high; bark pale or dark brown; branches widely spreading, zigzag or even tortuous, the younger ones silky towards the tips. Leaves of young plants extremely variable; the first 2 or 3 oblong or elliptic, entire, acute; then suddenly followed by narrow-linear leaves $\frac{1}{2}$–$\frac{3}{4}$ in. long by

Pittosporum obcordatum, Raoul,
var. Kaitaiaensis, Laing and Gourlay.
"Kaitaia" Matthews, Carse.
see Laing and Gourlay - T.N.Z.I. Vol. 65, p. 47.

2-valved.—*Hook. f. Fl. Nov. Zel.* i (1853) 22; *Handb. N.Z. Fl.* (1864) 20; *T. Kirk Students' Fl.* (1899) 48; *Cheesem. Man. N.Z. Fl.* (1906) 55.

NORTH ISLAND: Auckland—Swamps near the outlet of Lake Tongonge, near Kaitaia, *R. H. Matthews! H. B. Matthews, H. Carse!* HAWKE'S BAY—Swampy ground by the Wairoa River, *G. O. K. Sainsbury!* SOUTH ISLAND: Canterbury—Shady woods near Akaroa, *Raoul.* October–December.

3. **P. fasciculatum** *Hook. f. Fl. Nov. Zel.* i (1853) 24.—A small tree 10–20 ft. high; bark black; branches spreading, glabrous. Leaves alternate, 2–4 in. long including the petiole, obovate-oblong or elliptic-oblong or lanceolate, obtuse or acute, narrowed into a short petiole, glabrous or the younger ones alone very slightly pubescent, coriaceous, dark-green above, paler beneath. Flowers densely fascicled in the upper axils or terminal; peduncles $\frac{1}{4}$–$\frac{1}{3}$ in. long, densely hoary tomentose, together with the linear bracts and ovate-lanceolate sepals. Petals linear-oblong, dark-purple. Capsule $\frac{1}{2}$–$\frac{2}{3}$ in. long, peduncle about the same length, usually decurved.—*Handb. N.Z. Fl.* (1864) 20. P. tenuifolium *var.* fasciculatum *T. Kirk in Trans. N.Z. Inst.* iv (1871) 262; *Students' Fl.* (1899) 47. P. Colensoi *var.* fasciculatum *Cheesem. Man. N.Z. Fl.* (1906) 53.

North and South Islands: Taupo, *Colenso!* volcanic plateau near Tongariro and Ruapehu, *T. Kirk, T. F. C.;* Awatere River, Marlborough, *H. J. Matthews!* Chalky Sound, *Lyall.* T. 72 (1942) 23.

It is with some hesitation that I replace Hooker's *P. fasciculatum* as a species. But it appears to me that such a course is inevitable unless both it and *P. Colensoi* are reduced to *P. tenuifolium*, a view which I am sure would not prove acceptable to the majority of New Zealand botanists. As it may be asked how far I am certain of the identity of my plant with Hooker's species, I may say that I hold one of Colenso's specimens of his *P. viride*, which Hooker selected as the type of *P. fasciculatum*. (See Fl. Nov. Zel. i (1853) p. 24.)

4. **P. Buchanani** *Hook. f. Handb. N.Z. Fl.* (1864) 725.—A shrub or small tree 10–20 ft. high, with slender spreading or ascending branches; young shoots and leaves silky-pubescent. Leaves alternate, 2–5 in. long, oblong or oblong-lanceolate or elliptic-oblong, rather membranous, acute or acuminate; margins flat, not waved; petioles slender. Peduncles axillary, solitary, slender, $\frac{1}{3}$–$\frac{2}{3}$ in. long, 1-flowered or rarely 2-flowered, glabrous or silky-pubescent. Sepals ovate-oblong, obtuse. Petals linear, dark-purple; claw long. Ovary silky. Capsule less than $\frac{1}{2}$ in. diam., subglobose, 3-valved, on long spreading peduncles.—*T. Kirk Students' Fl.* (1899) 47; *Cheesem. Man. N.Z. Fl.* (1906) 54.

North Island: Auckland—Kaitaia and Mangonui, *Buchanan!* Taranaki—Near Mount Egmont, *Hector!* Wellington—In several localities, *T. Kirk!*

[illegible] flat, not waved. Flowers both terminal and in the axils of the upper leaves, solitary or in 2–3-flowered clusters; peduncles short, pubescent. Sepals oblong, obtuse or subacute, silky. Capsules usually terminal, large, nearly $\frac{3}{4}$ in. diam., broadly ovoid or obovoid, downy, 2–3-valved; peduncles stout, decurved.—*Students' Fl.* (1899) 48; *Cheesem. Man. N.Z. Fl.* (1906) 54.

North Island: Auckland—Kawau Island, *T. Kirk!* October–November.

A puzzling plant, in habit and foliage not to be distinguished from large forms of *P. tenuifolium*, but the flowers are chiefly terminal and often fascicled, and the capsule is much larger, exactly matching that of *P. ellipticum*. Only one tree has been seen, and that was cut down several years ago. *P. ellipticum* is not known on Kawau Island or in the neighbourhood, or I should have felt tempted to have considered it as a hybrid between that species and *P. tenuifolium*.

6. **P. Huttonianum** *T. Kirk in Trans. N.Z. Inst.* ii (1870) 92.—A sparingly branched shrub or small tree 10–25 ft. high; bark black; young leaves and branches covered with white floccose tomentum, becoming glabrous when mature. Leaves alternate, 3–5 in. long, broadly oblong elliptic-oblong or obovate-oblong, obtuse or acute, coriaceous, flat; petioles $\frac{1}{2}$–$\frac{3}{4}$ in. long. Flowers either axillary and solitary or in 2–5-flowered axillary and terminal cymes; peduncles slender, covered with loose white tomentum. Sepals oblong or lanceolate, acute, tomentose. Petals ligulate, sharply recurved. Ovary silky. Capsules larger than in *P. tenuifolium*, $\frac{3}{4}$ in. diam., globose or broadly obovoid, 3-valved, rarely 2-valved, downy or nearly glabrous.—*Students' Fl.* (1899) 48; *Cheesem. Man. N.Z. Fl.* (1906) 54.

North Island: Great and Little Barrier Islands, *T. Kirk!* Cape Colville Peninsula, from Cabbage Bay to Ohinemuri, *T. Kirk! T. F. C., Adams!* October–November. Sea-level to 1500 ft.

Varies much in the number and position of the flowers, which may be either solitary or axillary, or collected into few-flowered cymes, which are then mostly terminal. In the latter case there is little to separate the species from states of *P. fasciculatum*, with the exception that *P. Huttonianum*, in the flowering season, always has the leaves, young branches, and inflorescence more or less clothed with white floccose tomentum, whereas *P. fasciculatum* has glabrous leaves and branches, and the rather scanty tomentum on the inflorescence cannot be described as white and floccose.

Ann. Sc. Nat. 1844 : 121.

7. **P. obcordatum** *Raoul Choix* (1846) 24, t. 24.—A shrub or small tree 6–15 ft. high; bark pale or dark brown; branches widely spreading, zigzag or even tortuous, the younger ones silky towards the tips. Leaves of young plants extremely variable; the first 2 or 3 oblong or elliptic, entire, acute; then suddenly followed by narrow-linear leaves $\frac{1}{2}$–$\frac{3}{4}$ in. long by $\frac{1}{8}$ in. broad, which may be entire, or more commonly are irregularly lobed, toothed, or pinnatifid. Leaves of mature plants alternate or in alternate fascicles of 2–4, $\frac{1}{2}$–$\frac{3}{4}$ in. long, broadly obovate or obcordate or almost orbicular, coriaceous, quite entire, glabrous or the margins and petioles occasionally furnished with silky hairs, gradually narrowed into a short slender petiole; veins conspicuous beneath. Flowers small, $\frac{1}{6}$ in. long, axillary, solitary or 2–3 together, pale-purple to saffron-yellow or almost white, sometimes with a stripe of dark-claret on the petals; peduncles short, slender, silky; sepals short, ovate-lanceolate, silky with white hairs; petals twice the length of the sepals, linear-lanceolate, with spreading tips; ovary silky. Capsule ovoid, acuminate, glabrous when old, $\frac{1}{4}$–$\frac{1}{3}$ in. long, 2-valved.—*Hook. f. Fl. Nov. Zel.* i (1853) 22; *Handb. N.Z. Fl.* (1864) 20; *T. Kirk Students' Fl.* (1899) 48; *Cheesem. Man. N.Z. Fl.* (1906) 55.

North Island: Auckland—Swamps near the outlet of Lake Tongonge, near Kaitaia, *R. H. Matthews! H. B. Matthews, H. Carse!* Hawke's Bay—Swampy ground by the Wairoa River, *G. O. K. Sainsbury!* South Island: Canterbury—Shady woods near Akaroa, *Raoul.* October–December.

The distribution of *P. obcordatum* is most puzzling. It was originally discovered by Raoul at Akaroa about 1841; but has not been since observed in that locality, although repeated search has been made for it. In 1901 it was collected by the late Mr. R. H. Matthews near Kaitaia, a locality quite 600 miles from Akaroa. Only a few specimens were seen, and impending drainage operations will probably destroy these in a short time. In the spring of 1920, however, it was unexpectedly discovered by Mr. G. O. K. Sainsbury by the side of the Wairoa River, some 12 or 15 examples being noticed. It may be remarked that this station is almost exactly intermediate between the two already known.

I have to express my thanks to Mr. Sainsbury for an excellent suite of specimens from the Wairoa locality, and for the totally unexpected proof, which is alluded to in my description, that the young seedlings have very different foliage from that of the mature plant. It should also be mentioned that the specimens from Kaitaia have the young leaves and branchlets more silky-pubescent, and the leaves rather larger, than is the case in the other localities.

8. **P. rigidum** *Hook. f. Fl. Nov. Zel.* i (1853) 22, t. 10 (*in part*).—A much-branched woody shrub 5–10 ft. high or more; branches stout or somewhat slender, more or less erect, not interlaced or divaricating; when young (together with the leaves and young capsules) densely clothed with ferruginous tomentum, but becoming glabrous when old. Leaves alternate, shortly petiolate, $\frac{1}{4}$–1 in. long or even more, oblong or obovate, obtuse, thick and coriaceous, in mature plants usually entire; young plants with the leaves slightly narrower, more or less toothed, especially towards the base. Such leaves often persist on mature plants for a considerable time. Flowers small, solitary and axillary, very shortly pedicelled. Sepals 5, ovate, caducous. Petals dull-purple. Capsule densely clothed with ferruginous hairs when young, coarsely granulate when old, broadly ovate-cordate, apiculate at the tip, $\frac{1}{4}$–$\frac{1}{3}$ in.; peduncles short, often decurved.—*Handb. N.Z. Fl.* (1864) 20; *T. Kirk Students' Fl.* (1899) 49; *Cheesem. Man. N.Z. Fl.* (1906) 55.

North Island: Mount Hikurangi, *Adams ! Petrie !* Lake Waikaremoana and Ruahine Mountains, *Colenso;* base of Ruapehu and Tongariro, *T. F. C., Cockayne;* Tararua Mountains, *H. H. Travers ! T. F. Arnold ! Petrie ! B. C. Aston ! Cockayne,* and others. South Island: Nelson—*Bidwill* and others. 2000–4000 ft. November–December.

Very closely allied to the following species, under which the differential characters of the two plants are pointed out.

9. **P. divaricatum** *Cockayne in Trans. N.Z. Inst.* xlvi (1914) 111.—A densely branched hard and rigid shrub 5–12 ft. high; branches stout, often extremely thick and woody, flexuose and interlaced, glabrous or nearly so. Leaves of young plants polymorphous, oblong or obovate to lanceolate or almost linear, $\frac{1}{2}$–$\frac{3}{4}$ in. long, lobed, dentate or unequally pinnate, usually thick and coriaceous. Leaves of mature plants $\frac{1}{4}$–$\frac{3}{4}$ in. long, linear-obovate to oblong or ovate, thick and coriaceous, glabrous, entire or variously dentate or crenate or lobed, obtuse, dark blackish-green. Flowers small, solitary, apparently terminal on short arrested branchlets which are often axillary. Sepals ovate or ovate-oblong, pale-green, caducous, faintly ciliate. Petals linear-spathulate, recurved at the apex, dark-purple. Ovary faintly hirsute. Capsules subglobose, $\frac{1}{4}$ in. diam., mucronate at the tip. Seeds 2–5.—*Cockayne in Trans. N.Z. Inst.* xliv (1912) t. 3, f. 2, and t. 8.

North Island: Volcanic plateau around Tongariro and Ruapehu, *Cockayne, T. F. C.* South Island: Not uncommon in mountain districts from Nelson and Marlborough southwards. Altitudinal range 500–3500 ft. December–January.

PITTOSPORUM DIVARICATUM GROUP

A. Mature capsules with normally only one ripe seed . . . . . P. anomalum
Mature capsules with normally at least several ripe seeds . . . . . B.

B. Flowers white to pale purple. P. obcordatum
Flowers dark purple . . . . . C.

C. Mature capsules with 7-12 ripe seeds . . . . . P. rigidum
Mature capsules with fewer ripe seeds. D.

D. Mature capsules carunculate P. crassicaule
Mature capsules not carunculate . . E.

E. Leaves in mature plant uniformly linear and almost invariably entire, up to 15 mm. long . . . . . P. lineare
Leaves in mature plants of two kinds, either linear-obovate to obovate or irregularly lobed . . . . . P. divaricatum

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See Laing & Gourlay: T.N.Z.I.: 65 (1935) 44-62.

P. obcordatum var. kaitaiaensis T. et.G.

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In the Flora and again in the Handbook this was included by Hooker in his circumscription of *P. rigidum*, to which it is certainly very closely allied. But it differs from that plant in the thick and rigid flexuose and interlaced branches; in the much more glabrous habit; in the much smaller polymorphous leaves; and in the juvenile leaves being largely evident in all stages of the growth of the plant.

10. **P. ellipticum** *T. Kirk in Trans. N.Z. Inst.* iv (1872) 266.—A small spreading tree with black bark, 15–25 ft. high; branchlets, young leaves, and inflorescence densely covered with ferruginous tomentum. Leaves 2–4 in. long, elliptic-oblong or elliptic-obovate to oblong-lanceolate, acute or obtuse, quite entire, coriaceous; petioles short, stout. Flowers in terminal 2–5-flowered umbels: peduncles short, decurved. Sepals ovate-lanceolate, acute, densely tomentose. Petals recurved at the tips. Capsules broadly ovoid, slightly compressed, $\frac{2}{3}$ in. diam., tomentose, 2-valved; valves faintly 2-lobed.—*Students' Fl.* (1899) 52; *Cheesem. Man. N.Z. Fl.* (1906) 57; *Ill. N.Z. Fl.* i (1914) t. 15.

Var. **ovatum** *T. Kirk Students' Fl. l.c.*—Leaves smaller, spreading, broadly elliptical or obovate, rounded at the apex. Flowers not seen.

Var. **decorum** *Cheesem.*—Leaves narrower. Flowers more numerous, in both terminal and lateral fascicles.

North Island: Whangaroa, *Buchanan! T. Kirk!* Mount Manaia, Whangarei Heads, *T. Kirk. T. F. C.*; coast north of the Manukau Harbour, Waitakerei West, *T. F. C.* Var. *decorum*: Ohinemuri Gorge, *T. F. C., Petrie!* Gordon Settlement, *Downard!* Hawai River, inland from Opotiki, *F. R. Field!* Aorangi Scenic Reserve, *V. Sherwood!* base of Mount Hikurangi, *G. T. Williams!* Var. *ovatum*: Whangaroa and Mount Manaia, *T. Kirk!* October–November.

A very variable plant. I am greatly puzzled with var. *decorum*, which agrees exactly with the type in the ferruginous tomentum, but differs in the inflorescence being both terminal and lateral. It has some points of agreement with *P. Huttonianum*, but never has the white floccose tomentum which is such a distinctive character when *P. Huttonianum* is in bloom.

11. **P. patulum** *Hook. f. Handb. N.Z. Fl.* (1864) 19.—An erect shrub or small tree 6–15 ft. high, glabrous except the young shoots and peduncles, which are sparingly clothed with fulvous silky hairs; branchlets stout. Leaves extremely variable, in the young state 1–2 in. long, $\frac{1}{6}$–$\frac{1}{3}$ in. broad, linear, closely and deeply lobed or pinnatifid, the lobes often again toothed, gradually passing into the mature stage, which is linear or linear-oblong, entire or crenate-serrate, coriaceous, obtuse, gradually narrowed into a short stout petiole. Flowers in 4–8-flowered terminal umbels, highly fragrant; pedicels slender, $\frac{1}{2}$ in. long. Sepals ovate-lanceolate, pointed. Petals twice as long as the sepals, obtuse, recurved at the tips. Capsules globose or broader than long, $\frac{1}{3}$ in. diam., compressed, 2-valved.—*T. Kirk Students' Fl.* (1899) 56; *Cheesem. Man. N.Z. Fl.* (1906) 56.

South Island: Nelson—Cobb Valley (to the north of Mount Arthur), *F. G. Gibbs!* Lake Rotoiti, *Buchanan! T. F. C.*; Wairau Mountains, *Sinclair*; Lake Guyon, *W. T. L. Travers*; Glacier Gully, Spenser Mountains, *T. Kirk!* Canterbury—Maitland Creek, head of Lake Ohau, *J. H. C. Bond ex Cockayne.* Altitudinal range 2000–4000 ft.

A very remarkable and distinct species, very local in its distribution. I have seen but few flowering specimens.

12. **P. Turneri** *Petrie n. sp.*—A small spreading shrub or small tree 6–20 ft. high; trunk seldom more than 6 in. diam.; bark dark-grey or brown. Young leaves and inflorescence at first clothed with soft pale fulvous hairs or tomentum. Young plants up to 5 or 8 ft. high furnished with divaricating

and interlaced often zigzag branches. Juvenile leaves alternate or fascicled at the tips of the branchlets, very variable in size and shape, broadly obovate-spathulate to linear-spathulate, entire or more or less toothed or lobed or almost pinnatifid, $\frac{1}{4}$–$\frac{1}{2}$ in. long or more, glabrous and coriaceous, passing by easy transitions into the leaves of the adult plant, which are borne on slender erect branches, not obviously divaricating. Leaves of adult plants $\frac{1}{2}$–$1\frac{1}{2}$ in. long, linear- or oblong-spathulate, gradually narrowed into a long slender base, coriaceous, entire or obscurely toothed or lobed. Flowers in 4–10-flowered termina umbels; pedicels short, slender, silky. Sepals ovate-lanceolate, acuminate. Petals narrow, nearly $\frac{1}{2}$ as long again as the sepals. Capsules globose, $\frac{1}{5}$–$\frac{1}{4}$ in. long, 2-valved, somewhat compressed; valves persistent, hard and woody.

North Island: Waimarino Plateau, western base of Ruapehu, *E. Phillips Turner, H. B. Matthews! H. Carse!* Altitudinal range 2000–3500 ft.

A very singular species, agreeing in some respects with *P. patulum*, but differing altogether in the juvenile plant, both in its divaricating habit and the shape of its leaves. The fruit appears to be smaller than in *P. patulum*.

13. **P. virgatum** *T. Kirk in Trans. N.Z. Inst.* iv (1872) 264.—A small spreading tree 15–20 ft. in height, with slender trunk and black bark; branchlets, young leaves, petioles, and inflorescence densely clothed with ferruginous tomentum. Leaves very variable, in young trees $\frac{3}{4}$–$1\frac{1}{2}$ in. long, linear-lanceolate or elliptic-lanceolate, entire lobed or pinnatifid, gradually passing into the mature forms, which are 1–2 in. long, elliptic-obovate to oblong-ovate to oblong-lanceolate, usually entire but occasionally sinuate or lobed, acute or obtuse, gradually narrowed into short petioles. Flowers terminal in 2–5-flowered umbels rarely solitary. Sepals linear-lanceolate, acuminate, densely clothed with ferruginous tomentum. Petals dark-purple, shortly reflexed at the tips. Capsule erect, globose or nearly so, $\frac{1}{2}$ in. diam., 2-valved, glabrous when fully mature.—*Students' Fl.* (1899) 50; *Cheesem. Man. N.Z. Fl.* (1906) 56.

North Island: Tematamahoe Range, near Ahipara, *H. B. Matthews! H. Carse!* coast south of Mangonui Harbour, *T. F. C.*; Whangaroa Harbour, *Buchanan! T. Kirk!* Great Barrier Island, *T. Kirk!* Coromandel and coast south of Kennedy's Bay, *T. F. C.*; hills near Tairua, *Adams!* September–October.

The ferruginous pubescence, small terminal umbels, narrow sepals, and small globose capsule are the best characters of this species, which is nearest to *P. ellipticum*. The extreme variability of the leaves in the young plants is noteworthy. The mature stage, which is usually entire, is seldom attained until the tree has flowered for some years.

14. **P. Matthewsii** *Petrie in Trans. N.Z. Inst.* lii (1920) 17.—A small compactly branched tree 20–25 ft. high, with black bark; branchlets, young leaves, petioles, and inflorescence more or less clothed with pale ferruginous tomentum. Leaves of young trees $\frac{1}{2}$–$1\frac{1}{4}$ in. long, $\frac{1}{6}$ in. broad, linear, entire or sinuate, glabrous or nearly so, gradually passing into the mature leaves, which are linear-oblong or narrow obovate-oblong, 1–$1\frac{3}{4}$ in. long, $\frac{1}{4}$ in. broad, subacute, glabrous or nearly so, slightly coriaceous, entire or rarely sinuate-dentate near the apex, gradually narrowed into short petioles. Flowers terminal, solitary or in 2–6-flowered umbels, rather small, $\frac{1}{3}$ in. long; peduncles equalling or shorter than the flowers, clothed, together with the sepals, with pale ferruginous tomentum; sepals linear-lanceolate, acute. Petals dark-red, reflexed. Capsules obovoid or subpyriform, rather more than $\frac{1}{2}$ in. long, shortly apiculate, glabrous when fully mature, 2-valved.

North Island: Auckland—Kennedy Bay, *H. B. Matthews !* October.

Much too close to *P. virgatum*, from which it can only be distinguished by the smaller and narrower linear-oblong leaves and the subpyriform capsule. It would have been much more appropriately kept as a variety.

15. **P. Ralphii** *T. Kirk in Trans. N.Z. Inst.* iii (1871) 161.—A laxly branched shrub 8–15 ft. in height, with dark-brown bark; branchlets, under-surface of leaves, petioles, and inflorescence densely clothed with thick white or buff tomentum. Leaves spreading, 2–5 in. long, oblong or oblong-obovate, quite entire, obtuse or acute, coriaceous, white with appressed tomentum beneath; margins flat; petioles slender, $\frac{1}{2}$–$\frac{3}{4}$ in. long. Flowers in terminal 3–10-flowered umbels; peduncles as long as the petioles. Sepals narrow-ovate, acuminate, tomentose. Petals spreading or recurved at the tips. Capsules on rather slender peduncles, broadly ovoid, $\frac{2}{3}$ in. long, pubescent, 3-valved.—*Students' Fl.* (1899) 51; *Cheesem. Man. N.Z. Fl.* (1906) 57.

North Island: East Cape district, not uncommon, *Banks* and *Solander ! Colenso ! H. Hill ! Adams* and *Petrie !* &c.; Hawke's Bay, *A. Hamilton !* Kaimanawa Mountains, *B. C. Aston;* between Wairoa and Lake Waikaremoana, *G. O. K. Sainsbury !* Upper Wanganui River, *H. C. Field;* Patea, *Dr. Ralph !* October–November.

Closely allied to *P. crassifolium*, but the leaves are much larger, oblong, not gradually narrowed into the petiole, and the margins are flat, not recurved, while the capsules are much smaller. It is without doubt the *P. crassifolium* of Banks and Solander's MSS., as is proved by their drawing and specimens; but unfortunately the name was applied by Putterlich and Cunningham to the following plant.

16. **P. crassifolium** *A. Cunn. Precur.* (1839) n. 612.—A shrub or small tree 15–30 ft. high; branches erect, fastigiate; bark dark-brown; branchlets, leaves below, petioles, and inflorescence densely clothed with white or buff appressed tomentum. Leaves 2–3 in. long, oblong-obovate or linear-obovate, gradually narrowed into a short stout petiole, obtuse, quite entire, very coriaceous, dark-green and shining above, clothed with white or buff tomentum beneath; margins recurved. Flowers unisexual, in terminal umbels; males 5–10-flowered; females 1–5-flowered; peduncles $\frac{3}{4}$–$1\frac{1}{2}$ in. long, drooping. Sepals oblong-lanceolate, tomentose. Petals twice as long as the sepals, revolute at the tips. Fruiting-peduncle stout, decurved. Capsules large, $\frac{3}{4}$–$1\frac{1}{4}$ in. long, subglobose, tomentose, 3- rarely 4-valved; valves very thick and woody.—*Putterlich Syn. Pittosp.* i (1839) 12; *Raoul Choix* (1846) 48; *Hook. f. Fl. Nov. Zel.* i (1853) 23; *Handb. N.Z. Fl.* (1864) 20; *Bot. Mag.* (1872) t. 5978; *T. Kirk Forest Fl.* (1889) t. 14; *Students' Fl.* (1899) 51; *Cheesem. Man. N.Z. Fl.* (1906) 58; *Ill. N.Z. Fl.* i (1914) t. 16.

Var. **strictum** *T. Kirk Trans. N.Z. Inst.* iv (1872) 266.—Fruiting-peduncles strict, erect. Capsules smaller.

Kermadec Islands: Northern shore of Sunday Island, *T. F. C., W. R. B. Oliver !* North Island: Abundant on the coast from the North Cape to Poverty Bay. Var. *strictum:* Little Barrier Island, *T. Kirk !* East Cape, *Bishop Williams.* *Karo.* September–October.

A well-known plant, readily distinguished by the strict habit, narrow-obovate coriaceous tomentose leaves, and large capsules. The flowers are usually dark-purple; but Mr. A. Osborne has sent me specimens of a yellow-flowered variety collected at Tryphena Harbour, Great Barrier Island.

17. **P. Fairchildii** *Cheesem. in Trans. N.Z. Inst.* xx (1888) 147.—A compact round-topped shrub 8–15 ft. high; branches slender, spreading; bark brown; branchlets, leaves, and peduncles clothed with white silky hairs when young, glabrous when mature. Leaves often crowded, spreading,

2–3 in. long, obovate or elliptic-obovate or elliptic-oblong, obtuse or acute, gradually narrowed into short stout petioles, coriaceous, margins flat. Flowers terminal, solitary or in 2–4-flowered umbels. Sepals linear-oblong, acute, tomentose. Petals more than twice as long as the sepals, recurved at the tips. Fruiting-peduncles slender, decurved. Capsules large, depressed, broader than long, $\frac{3}{4}$–1 in. diam., glabrous even when half-grown, 3–4-valved; valves hard and woody, often lobed.—*T. Kirk Students' Fl.* (1899) 51; *Cheesem. Man. N.Z. Fl.* (1906) 58.

North Island: Three Kings Islands, *T. F. C.* August–September.

Differs from *P. crassifolium* in the broader flat leaves and smaller glabrous depressed capsule. It approaches *P. umbellatum* in the foliage, but is readily distinguished by the silky tomentose branchlets, fewer flowers, and much larger capsules.

18. **P. umbellatum** *Banks and Sol. ex Gaertn. Fruct.* i (1788) 286, t. 59.—A small branching tree 12–25 ft. high, perfectly glabrous except the young shoots, which are thinly clothed with silky fulvous hairs. Leaves alternate or subwhorled, 2–4 in. long, obovate-oblong or elliptic-oblong or lanceolate-oblong, obtuse or acute, coriaceous, dark-green above, paler below, narrowed into rather long petioles $\frac{1}{2}$–$\frac{3}{4}$ in. long. Flowers in many-flowered terminal umbels; peduncles slender, longer than the petioles. Sepals ovate-lanceolate. Petals ligulate, obtuse, slightly recurved. Ovary pubescent. Fruiting-peduncles slender, decurved. Capsules $\frac{1}{2}$ in. diam., rounded, tetragonous or 4-lobed, 2-valved; valves woody, granulate.—*A. Cunn. Precur.* (1839) n. 613; *Raoul Choix* (1846) 48; *Hook. f. Fl. Nov. Zel.* i (1853) 24; *Handb. N.Z. Fl.* (1864) 21; *T. Kirk Students' Fl.* (1899) 50; *Cheesem. Man. N.Z. Fl.* (1906) 50. T. 56 (1926) 85.

Var. **cordatum** *T. Kirk in Trans. N.Z. Inst.* iv (1872) 264.—Leaves narrower, linear-obovate or obovate-spathulate, acute, gradually narrowed into the petiole. Capsules rounded, cordate, acuminate; valves not lobed.

North Island: Not uncommon along the eastern shores, from the North Cape to Gisborne. Var. *cordatum:* Haratoanga, Great Barrier Island, *T. Kirk!* September–November.

Easily recognized by the many-flowered umbels and roundish 4-lobed capsules. I have seen no specimens from the western side of the North Island.

19. **P. Kirkii** *Hook. f. ex T. Kirk in Trans. N.Z. Inst.* ii (1870) 92.—A stout sparingly branched glabrous shrub 4–12 ft. high, often epiphytic; branches stout; bark reddish-purple. Leaves crowded or whorled, 2–5 in. long, linear-obovate, obtuse or subacute, very thick and coriaceous, quite entire, gradually narrowed into a short stout petiole; margins thickened, slightly recurved. Flowers yellow, in terminal 3–10-flowered umbels. Sepals lanceolate, acuminate. Petals more than twice as long as the sepals, very narrow-linear, acuminate, sharply recurved. Fruiting-peduncles short, stout, erect. Capsules large, $1\frac{1}{2}$ in. long, elliptic-oblong or elliptic-obovoid, 2-valved, quite glabrous, cuspidate.—*T. Kirk Students' Fl.* (1899) 50; *Cheesem. Man. N.Z. Fl.* (1906) 59; *Ill. N.Z. Fl.* i (1914) t. 17.

North Island: Maungataniwha Ranges, *T. F. C., H. Carse!* between Whangape and Hokianga, *T. Kirk!* Bay of Islands, *A. Cunningham;* Whangarei, *Buchanan;* Maungatapere, *T. F. C., H. Carse!* plateau near Taheke, *Petrie!* Waipoua Forest, *Cockayne;* Great Barrier Island and Omaha, *T. Kirk!* Cape Colville Peninsula, from Cabbage Bay and Moehau to Te Aroha Mountain, *T. Kirk, T. F. C., Adams!* Titirangi and Waitakerei Ranges, *T. F. C.;* Waimarino Plateau, *E. Phillips Turner;* Mount Egmont Ranges, *Adams* and *T. F. C.* Altitudinal range from 800 to 3000 ft. December–January.

A handsome and well-marked species, which cannot be confounded with any other.

20. **P. cornifolium** *A. Cunn. Bot. Mag.* (1832) t. 3161.—A slender sparingly branched shrub 2–5 ft. high, usually growing as an epiphyte on the trunks or branches of forest-trees, more rarely on rocks, never truly terrestrial. Branches forked or whorled, glabrous, or the younger ones silky-pubescent. Leaves whorled, 1½–2½ in. long, elliptic-lanceolate or elliptic-obovate, acute, coriaceous, quite entire, glabrous; petioles very short. Flowers polygamous or dioecious, in 3–5-flowered terminal umbels; female umbels 1–3-flowered, smaller and on shorter peduncles. Sepals linear-subulate. Petals much longer, subulate-lanceolate, broad at the base and then narrowed into long acuminate points. Capsules erect or inclined, ½ in. diam., broadly ovoid or obovoid, 3-valved; valves orange-yellow inside.—*A. Cunn. Precur.* (1839) n. 616; *Raoul Choix* (1846) 48; *Hook. f. Fl. Nov. Zel.* i (1853) 23; *Handb. N.Z. Fl.* (1864) 21; *T. Kirk Students' Fl.* (1899) 49; *Cheesem. Man. N.Z. Fl.* (1906) 59.

T. 71 (1944) 86.

North Island: From the North Cape to Wellington; abundant in the north, often local to the south of Hawke's Bay. Kapiti Island: *B. C. Aston.* South Island: Pelorus Sound and Titi Island, *J. Rutland!* West Wanganui Inlet, *B. C. Aston!* Sea-level to 2000 ft. June–September.

This is a common plant in the forests of the Auckland District, growing intermixed with other epiphytes on the trunks and branches of the rata (*Metrosideros robusta*) and other large forest-trees.

21. **P. pimeleoides** *R. Cunn. ex A. Cunn. Precur.* (1839) n. 618.—A small slender much-branched shrub 1–5 ft. in height; branchlets usually numerous, almost filiform, pilose when young. Leaves numerous, crowded or whorled, very variable in size and shape, ½–1½ in. long, $\frac{1}{10}$–⅓ in. broad, linear-lanceolate to linear-oblong, acute or acuminate, rarely obluse, entire or rarely obscurely crenulate, patent or reflexed, somewhat membranous. Flowers small, yellow-red, in terminal 2–8-flowered umbels or solitary, unisexual; males larger, more numerous, and on longer peduncles than the females; peduncles slender, silky-pilose. Sepals subulate, acuminate. Petals more than twice as long as the sepals, very narrow-linear, acuminate. Ovary silky. Capsules on short erect peduncles, ovoid, acuminate, almost beaked, 2-valved.—*Raoul Choix* (1846) 48; *Hook. f. Fl. Nov. Zel.* i (1853) 24; *Handb. N.Z. Fl.* i (1864) 21; *T. Kirk Students' Fl.* (1899) 49; *Cheesem. Man. N.Z. Fl.* (1906) 60. P. crenulatum *Putterlich Syn. Pittosp.* (1839) 15.

Var. **major** *Cheesem. Man. N.Z. Fl.* (1906) 60.—Branches few, slender. Leaves in distant whorls, elliptical or elliptical-obovate, ¾–1½ in. long, ½ in. broad. Capsule rather larger.

Var. **reflexum** *Hook. f. Fl. Nov. Zel.* i (1853) 24.—Leaves smaller, crowded, linear or linear-lanceolate, acuminate, $\frac{1}{12}$–⅛ in. broad.—P. reflexum *R. Cunn. l.c.* n. 617; *Hook. f. Handb. N.Z. Fl.* (1864) 19. P. radicans *R. Cunn. l.c.* n. 619. P. Gilliesianum *T. Kirk in Trans. N.Z. Inst.* i (1868) 143.

North Island: North Cape (var. *major*), *T. F. C.*; near Mangonui, *T. Kirk! T. F. C., R. H. Matthews!* Whangaroa, *R. Cunningham;* Kawakawa River, Bay of Islands, *R. Cunningham, Sir J. D. Hooker, T. Kirk!* March–May.

Easily recognized by its small size and slender habit, narrow leaves, terminal umbels of yellow-red flowers, and small-beaked capsules. Notwithstanding the opinion expressed in the first edition of this work, I am now inclined to think that Cunningham's *P. reflexum* will ultimately be re-established as a species. I much regret, too, that no further material has been obtained of my var. *major*, which also may prove to be distinct. It may probably answer to Cunningham's *P. cornifolium* var. *b.*

22. **P. eugenioides** *A. Cunn. Precur.* (1839) n. 614.—A small branching round-headed tree 20–40 ft. high, perfectly glabrous except a few silky hairs on the branches of the inflorescence; trunk 1–2 ft. diam.; bark pale. Leaves alternate or almost whorled, 2–4 in. long, elliptical or elliptical-oblong, acute or subacute, slightly coriaceous, narrowed into slender petioles ½–1 in. long; margins often undulate. Flowers polygamous or dioecious, small, yellowish, in terminal branched many-flowered compound umbels or corymbs; peduncles and pedicels slender, spreading, silky-pubescent. Sepals ovate-lanceolate, acuminate, glabrous. Petals linear-oblong, spreading and recurved, more than twice as long as the sepals. Capsules numerous, small, ¼ in. long, ovoid, acute, glabrous, 2–3-valved.—*Hook. f. Fl. Nov. Zel.* i (1853) 22; *Handb. N.Z. Fl.* (1864) 21; *T. Kirk Forest Fl.* (1889) 49; *Students' Fl.* (1899) 52; *Cheesem. Man. N.Z. Fl.* (1906) 60. P. elegans *Raoul Choix* (1846) 25. P. microcarpum *Putterlich Syn. Pittosp.* (1839) 15.

North and South Islands: Common from the North Cape to the south of Otago. *Tarata.* September–October. Sea-level to 2500 ft.

The largest of the New Zealand species, and the only one with a compound inflorescence. The flowers are highly fragrant, and were formerly mixed by the Maoris with fat and used for anointing their bodies.

23. **P. Dallii** *Cheesem. Man. N.Z. Fl.* (1906) App. 1134.—A small round-topped tree from 12 to 18 ft. high; trunk sometimes 8 in. diam.; bark of stem and larger branches light-grey. Branchlets stout, often subwhorled, glabrous; bark reddish. Leaves towards the tips of the branchlets, the lower alternate, the upper subopposite or whorled, 2–4 in. long, ½–1½ in. broad, narrow, elliptic-oblong or elliptic-lanceolate, acute or somewhat acuminate, rigidly coriaceous, quite glabrous or the very young ones sparingly tomentose, sharply and coarsely serrate; midrib stout, prominent above; veins finely reticulated; petioles stout, reddish, ½–¾ in. long. Flowers numerous, white, fragrant, arranged in a dense terminal compound cyme 1–2 in. diam.; bracts many, deciduous, but conspicuous in the early flowering stage; the lower large, membranous, brownish, oblong or oblong-lanceolate, often 1 in. long; the upper gradually becoming smaller and narrower; the uppermost narrow subulate-lanceolate, ⅓–½ in. long; both bracts and pedicels more or less silky-tomentose. Flowers ¼–⅔ in. long, ½ in. diam. when fully expanded; sepals ½–⅔ the length of the corolla, narrow linear-subulate, attentuate at the tips; petals linear-obovate or linear-oblong, obtuse, conspicuously veined. Stamens included; anthers rather large, bright-yellow. Ovary shortly stipitate, with very numerous ovules to each placenta; style stout, cylindrical. Capsules forming dense clusters at the tips of the branchlets, ½ in. long, elliptic-oblong, apiculate, glabrous, 2-valved; valves woody. Seeds numerous, immersed in a viscid gluten; often persistent after the fall of the valves as a viscid ball at the top of the pedicel.—*Cheesem. in Trans. N.Z. Inst.* xlvi (1914) 19.

South Island: Nelson—Mountains behind Collingwood, at Specimen Creek and Snow's Valley, near Boulder Lake, alt. 3500 ft., *J. Dall! F. G. Gibbs!* January.

P. Dallii is not closely related to any other species, either in New Zealand or else where. It is the only New Zealand species with regularly serrate leaves or white flowers, and with the single exception of *P. eugenioides* none of our species has such a well-developed inflorescence. When in flower it must be a very beautiful plant. The fragrance of the flowers is another attractive characteristic. *P. Dallii* appears to be rare in its only known habitat, and only a limited number of adult plants have been seen.

Family XLIX. **CUNONIACEAE.**

Shrubs or trees. Leaves opposite or whorled, coriaceous, simple or 3–5-foliolate or imparipinnate. Stipules present, often interpetiolar as in *Rubiaceae*. Flowers small, usually hermaphrodite. Sepals 4–5. Petals 4–5, inserted under the margin of a perigynous disc, occasionally wanting. Stamens perigynous, 4–5, or 5–10, or numerous. Ovary 2-celled or rarely divided into 2 separate carpels. Ovules 2 to many, in 2 rows in each cell; styles 2 or rarely combined. Fruit generally capsular, or rarely (in genera not found in New Zealand) a drupe or nut.

Genera 21; species about 120, mostly found in the subtropical parts of the Southern Hemisphere.

Flowers panicled. Calyx valvate .. .. 1. ACKAMA.
Flowers racemose. Calyx imbricate .. .. 2. WEINMANNIA.

1. **ACKAMA** A. Cunn. 1839.

Small trees. Leaves opposite, pinnate, stipulate. Flowers small, unisexual, in compound panicles. Calyx-tube short, lobes 5, ovate-triangular, persistent, valvate. Petals 5, inserted under the margin of a perigynous disc, scarcely longer than the calyx. Stamens 10, inserted with the petals; filaments filiform, the alternate ones longer; anthers didymous. Ovary free, 2-celled; styles 2, persistent; ovules numerous in each cell. Capsule small, coriaceous, turgid, 2-celled, septicidally 2-valved. Seeds ovoid, apiculate, hairy; embryo cylindric, in the axis of fleshy albumen.

Besides the New Zealand species, which is endemic, there is another from eastern Australia (*A. Muelleri* Benth.) and one from New Guinea (*A. Nymani* K. Schum.). The genus only differs from *Weinmannia* in the paniculate inflorescence and valvate calyx.

1. **A rosaefolia** *A. Cunn. Precur.* (1839) n. 520.—A handsome small tree 20–40 ft. high, with a trunk 1–2 ft. diam.; branchlets, leaves, petioles, and inflorescence more or less covered with short brownish pubescence. Leaves 3–10 in. long, imparipinnate; leaflets 3–8 pairs, 1–3 in. long, narrow-oblong to elliptical, sessile or very shortly petioled, acute, acutely serrate, membranous, upper larger than the lower; stipules large, eafy, toothed, deciduous. Panicles much branched, many-flowered, longer or shorter than the leaves. Flowers unisexual, minute, $\frac{1}{10}$ in. diam., sessile on the slender branches of the panicle. Ovary densely pilose. Capsule very small, $\frac{1}{8}$ in. long, sparingly silky when mature.—*Raoul Choix* (1846) 47; *Hook. f. Fl. Nov. Zel.* i (1853) 79; *Handb. N.Z. Fl.* (1864) 60; *T. Kirk Forest Fl.* (1889) t. 63; *Students' Fl.* (1899) 139; *Cheesem. Man. N.Z. Fl.* (1906) 137; *Ill. N.Z. Fl.* i (1914) t. 42.

NORTH ISLAND: From Kaitaia and Mangonui southwards to Whangarei, not common. *Makamaka.* September–October.

A very attractive small tree, which should be generally planted in shrubberies in the northern part of the Dominion and elsewhere.

2. **WEINMANNIA** Linn. 1759.

Shrubs or trees. Leaves opposite, petiolate, simple or 3-foliolate or imparipinnate, stipulate. Flowers in terminal or axillary racemes. Calyx inferior, divided almost to the base into 4–5 imbricate segments. Petals 4–5, inserted under the margin of a perigynous disc. Stamens 8–10, inserted with the petals. Ovary free, ovoid or conic, 2-celled, 2-beaked;

styles 2, subulate; ovules few or many in each cell, pendulous. Capsule small, coriaceous, 2-celled, septicidally 2-valved. Seeds oblong or reniform or subglobose, often hairy; embryo terete; albumen fleshy.

A rather large genus of over 80 species, distributed through the Malay Archipelago, Madagascar, Mauritius, tropical South America, Polynesia, and Australia. The two New Zealand species are both endemic.

Branchlets usually pubescent. Leaves of mature trees 3-foliolate or pinnate .. .. 1. *W. sylvicola.*

Branchlets usually glabrous. Leaves of mature trees 1-foliolate .. 2. *W. racemosa.*

1. **W. sylvicola** *Sol. ex A. Cunn. Precur.* (1839) n. 518.—An erect tree, usually from 25 to 50 ft. high, sometimes taller and reaching 60–70 ft.; trunk 1–3 ft. diam.; branchlets, petioles, and midribs of the leaves and inflorescence more or less pubescent or almost glabrous. Leaves 3-foliolate or imparipinnate, rarely 1-foliolate; leaflets 1 to 4 or 5 pairs or more, 1–2 in. long, obovate-oblong or ovate-oblong to lanceolate, narrowed below, acute or acuminate, coarsely serrate. Leaves of young trees pinnate, with numerous membranous leaflets; of old ones usually 3-foliolate, coriaceous. Stipules leafy, entire or toothed. Racemes 1–4 in. long, often numerous towards the ends of the branches, sometimes branched. Flowers very numerous, small, $\frac{1}{12}$ in. diam., white or pale-rose. Capsule usually glabrous, $\frac{1}{6}$–$\frac{1}{5}$ in. long. Seeds minute, with a tuft of hairs at each end.—*Raoul Choix* (1846) 47; *Hook. f. Fl. Nov. Zel.* i (1853) 79; *Handb. N.Z. Fl.* (1864) 60; *T. Kirk Forest Fl.* (1889) t. 72; *Students' Fl.* (1899) 140; *Cheesem. Man. N.Z. Fl.* (1906) 138. W. betulina *and* W. fuchsioides *A. Cunn. Precur.* (1839) n. 516, 517.

North Island: Abundant in forests as far south as the East Cape and Taupo, ascending to 3000 ft. *Tawhero.* December–April.

W. sylvicola is an abundant tree in the northern half of the North Island, often forming a large proportion of the forest, especially near the outskirts. It is remarkable for the great difference between the juvenile and adult states, the former often persisting for many years. The bark contains a large percentage of tannin, and was formerly much used in the Auckland tanneries.

2. **W. racemosa** *Linn. f. Suppl.* (1781) 227.—A taller tree than *W. sylvicola*, frequently from 50 to 80 ft. high or more, with a trunk 1–4 ft. diam.; glabrous when mature, except the raceme, which is pubescent. Leaves of young plants pinnately 3–5-foliolate, thin and membranous, often pubescent; of mature plants 1-foliolate, 1–4 in. long, oblong-lanceolate or oblong-ovate to orbicular-ovate, obtuse or subacute, coarsely and obtusely serrate, very coriaceous, quite glabrous. Racemes 1–4 in. long, axillary and terminal, sometimes branched; rhachis pubescent; pedicels stout. Flowers numerous, very similar to those of *W. sylvicola* but rather larger. Ovary pubescent. Capsule $\frac{1}{5}$ in. long, 2–3-valved. Seeds hairy.—*Forst. f. Prodr.* (1786) n. 173; *A. Rich. Fl. Nouv. Zel.* (1832) 322; *Hook. f. Fl. Nov. Zel.* i (1853) 80; *Handb. N.Z. Fl.* (1864) 61; *T. Kirk Forest Fl.* (1889) t. 73; *Students' Fl.* (1899) 140; *Cheesem. Man. N.Z. Fl.* (1906) 139; *Ill. N.Z. Fl.* i (1914) t. 43. Leiospermum racemosum *Don in Edinb. N. Phil. Journ.* (1830) 91; *A. Cunn. Precur.* (1839) n. 519.

North and South Islands, Stewart Island: Plentiful in forests from the Thames goldfields and Middle Waikato southwards. Sea-level to 3000 ft. *Towai; Kamahi.* December–January.

Very closely allied to *W. sylvicola*, but can generally be separated by the larger 1-foliolate leaves of the mature stage.

Family L. **ROSACEAE.**

Herbs, shrubs, or trees. Leaves simple or compound, alternate or rarely opposite, stipulate. Flowers usually regular and hermaphrodite, sometimes unisexual. Calyx with the tube free or adnate to the ovary, limb 4–5-lobed, lobes imbricate or valvate. Petals 4–5, rarely wanting, free, inserted on the calyx at the base of the lobes, imbricate. Stamens many, rarely few, inserted on the calyx just within the petals; filaments subulate, often incurved in bud; anthers small, didymous. Ovary of 1 or more free or coherent 1-celled carpels, sometimes adnate to the calyx-tube; styles free or connate; ovules 1 or 2 to each carpel, anatropous. Fruit very various, superior, or more or less inferior and combined with the calyx-tube, of one or many achenes, drupes, or follicles, or a pome, more rarely a berry or capsule. Seeds erect or pendulous, albumen generally wanting; embryo with large plano-convex cotyledons and a stout radicle.

A large family, found all over the world, but most abundant in the temperate and colder parts of the Northern Hemisphere; comparatively rare in the tropics and in the South Temperate Zone. Genera about 100; species from 1700 to 2000. It includes most of the important cultivated fruits of northern origin, as peaches, plums, apricots, cherries, apples, pears, strawberries, raspberries, &c.; as well as the rose, with its numberless garden varieties. Of the 4 New Zealand genera, *Acaena* is mainly South American, but extends northwards to California and south-eastwards to Australia and New Zealand; the 3 others are widely spread in temperate regions. Many northern species have established themselves in New Zealand, as will be seen on referring to the list of introduced plants given in the appendix.

Scrambling or climbing shrubs with prickly stems. Fruit of many crowded succulent carpels	1. RUBUS.
Herbs with pinnately lobed or divided leaves. Styles elongating after flowering. Fruit-carpels numerous, dry	2. GEUM.
Herbs with pinnate leaves. Styles not elongating after flowering. Fruit-carpels numerous, dry	3. POTENTILLA.
Herbs with pinnate leaves. Fruiting-calyx usually with stiff bristles, often barbed at the top. Carpels 1, rarely 2	4. ACAENA.

1. **RUBUS** Linn.

Scrambling or climbing shrubs, rarely herbs, almost always prickly. Leaves alternate, simple or compound, usually palmately or pinnately divided into 3–5 lobes or segments or separate leaflets; stipules adnate to the petiole. Flowers in terminal or axillary panicles, rarely solitary. Calyx-tube broad, open; lobes 5, persistent. Petals 5. Stamens numerous. Disc coating the calyx-tube. Carpels many, seated on a convex receptacle; style subterminal; ovules 2, pendulous. Fruit composed of many succulent 1-seeded drupes, crowded upon an oblong or conical dry receptacle. Seed pendulous.

A large genus, common in the temperate portions of the Northern Hemisphere, rarer in the tropics and South Temperate Zone. The fruits of all the species are edible, and some of them, such as the raspberry and blackberry, both of which have become naturalized in New Zealand, are excellent. All the New Zealand species are endemic; and, like those from other countries, are exceedingly variable, running into varieties that are difficult to define.

* Leaves 3–5-foliolate.

A lofty climber. Leaflets glabrous, cordate or truncate at the base. Panicles large. Flowers white	1. *R. australis.*
Climbing or scrambling, often forming a dense bush. Leaflets glabrous, rounded or cuneate at the base. Panicles small. Flowers yellowish	2. *R. cissoides.*

Climbing or scrambling, often forming a dense bush. Leaflets often tomentose beneath, broadly ovate. Fruit large, yellowish .. .. 3. *R. schmidelioides.*

** Leaves 1-foliolate.

Small, prostrate. Leaves sharply dentate. Fruit very large .. 4. *R. parvus.*

1. **R. australis** *Forst. f. Prodr.* (1786) 224.—A tall climber, reaching the tops of the highest trees; stems stout, woody at the base; branches slender, drooping, armed with scattered recurved prickles. Leaves 3–5-foliolate or rarely pinnate with 2 pairs of leaflets and a terminal one; leaflets coriaceous, glabrous, very variable in size and shape, 2–5 in. long, ovate-oblong or ovate-lanceolate to linear-oblong or almost linear, acute or acuminate, truncate or cordate at the base, sharply serrate; petioles and midribs armed with recurved prickles. Panicles large, much branched, 6–24 in. long, leafy towards the base; pedicels short, glandular or pubescent. Flowers white, $\frac{1}{3}$–$\frac{1}{2}$ in. diam., dioecious; males larger and more conspicuous than the females. Petals broadly ovate or oblong. Fruit $\frac{1}{4}$ in. diam., reddish-orange.—*A. Rich. Fl. Nouv. Zel.* (1832) 340; *A. Cunn. Precur.* (1839) n. 567; *Raoul Choix* (1846) 49; *T. Kirk Students' Fl.* (1899) 125; *Cheesem. Man. N.Z. Fl.* (1906) 125. R. australis *var.* glaber *Hook. f. Fl. Nov. Zel.* i (1853) 53, t. 14; *Handb. N.Z. Fl.* (1864) 54.

North and South Islands, Stewart Island: Abundant from the Three Kings Islands and the North Cape southwards. Sea-level to 3000 ft. *Tataramoa; Bush-lawyer.* September–November.

Very variable; but easily distinguished from the other species by the large size, glabrous leaflets cordate or truncate at the base, large panicles, white flowers, and small red fruit.

2. **R. cissoides** *A. Cunn. Precur.* (1839) n. 569.—A scrambling or climbing shrub; branchlets slender, unarmed, usually much and closely interlaced, forming a dense bush. Leaves 3–5-foliolate; leaflets 2–5 in. long, narrow-ovate to lanceolate or linear-lanceolate, acuminate, rounded or cuneate at the base, sharply and irregularly serrate or lobed; petioles varying much in length, furnished with fewer and softer prickles than in *R. australis.* Panicles 2–6 in. long, often reduced to racemes; pedicles pubescent or glabrate. Flowers yellowish-white, $\frac{1}{3}$ in. diam., dioecious. Calyx-lobes broadly ovate, tomentose. Petals linear-oblong. Fruit orange-red, much as in *R. australis.*—*Raoul Choix* (1846) 49; *T. Kirk Students' Fl.* (1899) 126; *Cheesem. Man. N.Z. Fl.* (1906) 125. R. australis *var.* cissoides *Hook. f. Fl. Nov. Zel.* i (1853) 53; *Handb. N.Z. Fl.* (1864) 54.

Var. **pauperatus** *T. Kirk l.c.*—Leaves almost wholly reduced to prickly midribs or sometimes with a minute lamina at the tip; prickles yellowish. Flowers seldom produced, save in shade.—*Fritsch in Oestr. Bot. Zeitschr.* xxxvi (1886) 259.

Var. **subpauperatus** *Cockayne in Report Bot. Stewart Id.* (1909) 42.—Leaves abundant or occasionally reduced to prickly midribs. Flowers not uncommon in shade; prickles reddish.

North and South Islands, Stewart Island: Not uncommon from the North Cape southwards, chiefly in lowland districts. September–November.

When growing in forest, and consequently in shade, the leaflets are usually well developed; but in open situations, exposed to sun and wind, they are frequently reduced in size, so that in var. *pauperatus* little remains beyond the prickly midribs.

(x) R. australis var. glabra Hk.f. Fl.NZ. 1853 53

(a) " " schmidelioides Hk.f. Fl.NZ. 1853: 53

australis, Forst f. 1786 p. 40.

3. **R. schmidelioides** *A. Cunn. Precur.* (1839) n. 568.—A scrambling or climbing shrub; branchlets usually unarmed, often intertwined, forming a dense bush; young shoots pubescent or tomentose. Leaves 3–5-foliolate; leaflets 2–4 in. long, orbicular-ovate or ovate-oblong to ovate-lanceolate, coriaceous, acute, rounded or cordate at the base, coarsely and irregularly toothed, usually tomentose or pubescent beneath; petioles and midribs with recurved prickles. Panicles 2–8 in. long; branches and pedicels stout, hispid or setose or pubescent. Flowers $\frac{1}{4}$ in. diam., whitish, dioecious. Calyx tomentose. Petals broad, rounded. Fruit $\frac{1}{3}$ in. diam., pale-yellowish, juicy. —*Raoul Choix* (1846) 49; *T. Kirk Students' Fl.* (1899) 126; *Cheesem. Man. N.Z. Fl.* (1906) 125. R. australis *var.* schmidelioides *Hook. f. Fl. Nov. Zel.* i (1853) 53; *Handb. N.Z. Fl.* (1864) 54.

Ann. Nat. Hist: 1839. iii 245.

Var. **coloratus** *T. Kirk l.c.* — Leaflets rugose, white beneath with appressed tomentum.

North and South Islands, Stewart Island.—Not uncommon throughout, but mostly in lowland districts. October–November.

NOMENCLATURE OF N.Z. SPECIES OF RUBUS.

NAMES AS IN CHEESEMAN' MANUAL 1925.	REVISED NAMES.
1. R. australis (Tataramoa or "bush lawyer")	R. cissoides A.Cunn.
2. R. cissoides ("leafless lawyer"or "yellow prickles")	R. squarrosus Fritch.
3. R. schmidelicides ("swamp lawyer")	R. australis Forst.f.
4. R. schmidelicides var. coloratus ("white leafed lawyer")	R. schmidelicides A. Cunn.

Some of the common names used are suggested by J. Andersen in T.N.Z.I. Vol. 56.

Further notes on Rubus in Transactions of Royal Society of N.Z. Vol. 65, page 226.

their margins serrate, not dentate.

2. **GEUM** Linn.

Perennial herbs. Radical leaves crowded, often rosulate, pinnate or pinnatisect; leaflets toothed or incised, the terminal one often much larger than the others; stem-leaves usually small and bract-like. Flowers in a

Climbing or scrambling, often forming a dense bush. Leaflets often tomentose beneath, broadly ovate. Fruit large, yellowish .. .. 3. *R. schmidelioides.*

** Leaves 1-foliolate.

Small, prostrate. Leaves sharply dentate. Fruit very large .. 4. *R. parvus.*

1. **R. australis** *Forst. f. Prodr.* (1786) 224.—A tall climber, reaching the tops of the highest trees; stems stout, woody at the base; branches slender, drooping, armed with scattered recurved prickles. Leaves 3–5-foliolate or rarely pinnate with 2 pairs of leaflets and a terminal one; leaflets coriaceous, glabrous, very variable in size and shape, 2–5 in. long, ovate-oblong or ovate-lanceolate to linear-oblong or almost linear, acute or acuminate, truncate or cordate at the base, sharply serrate; petioles and midribs armed with recurved prickles. Panicles large, much branched, 6–24 in. long, leafy towards the base; pedicels short, glandular [illegible] in. diam., dioecious; males larger and

[illegible]

[illegible] produced, save in [illegible]

[Var.] **subpauperatus** *Cockayne in Report Bot. Stewart Id.* (1909) 42.—Leaves abundant or occasionally reduced to prickly midribs. Flowers not uncommon in shade; prickles reddish.

North and South Islands, Stewart Island: Not uncommon from the North Cape southwards, chiefly in lowland districts. September–November.

When growing in forest, and consequently in shade, the leaflets are usually well developed; but in open situations, exposed to sun and wind, they are frequently reduced in size, so that in var. *pauperatus* little remains beyond the prickly midribs.

3. **R. schmidelioides** *A. Cunn. Precur.* (1839) n. 568. — A scrambling or climbing shrub; branchlets usually unarmed, often intertwined, forming a dense bush; young shoots pubescent or tomentose. Leaves 3–5-foliolate; leaflets 2–4 in. long, orbicular-ovate or ovate-oblong to ovate-lanceolate, coriaceous, acute, rounded or cordate at the base, coarsely and irregularly toothed, usually tomentose or pubescent beneath; petioles and midribs with recurved prickles. Panicles 2–8 in. long; branches and pedicels stout, hispid or setose or pubescent. Flowers $\frac{1}{3}$ in. diam., whitish, dioecious. Calyx tomentose. Petals broad, rounded. Fruit $\frac{1}{3}$ in. diam., pale-yellowish, juicy. —*Raoul Choix* (1846) 49; *T. Kirk Students' Fl.* (1899) 126; *Cheesem. Man. N.Z. Fl.* (1906) 125. R. australis *var.* schmidelioides *Hook. f. Fl. Nov. Zel.* i (1853) 53; *Handb. N.Z. Fl.* (1864) 54.

Var. **coloratus** *T. Kirk l.c.* — Leaflets rugose, white beneath with appressed tomentum.

North and South Islands, Stewart Island.—Not uncommon throughout, but mostly in lowland districts. October–November.

Dr. Cockayne has pointed out (Report on the Waipoua Kauri Forest, p. 28) that this species possesses a juvenile state very different to the adult. It forms large creeping masses covering the ground, furnished with thin and small reticulately veined leaves, which have little resemblance to the much larger stiff and coriaceous leaves of the fully-grown plant.

4. **R. parvus** *Buch. in Trans. N.Z. Inst.* vi (1874) 243, t. 22, f. 2 *and* 3.— A dwarf prostrate glabrous shrub; stems creeping, 12–18 in. long, sometimes partly buried in the soil and rooting at the nodes; bark red; prickles few. Leaves 1-foliolate; leaflets bronzy, coriaceous, 1–3 in. long, linear or linear-lanceolate, acute, slightly cordate or truncate at the base, acutely dentate; teeth almost spinous; petioles and midrib with a few stout prickles. Flowers few, dioecious, in short terminal or axillary panicles or solitary; pedicels pubescent. Calyx-lobes silky-pubescent, acuminate, reflexed. Petals white, barely exceeding the calyx. Fruit large, $\frac{1}{2}$–1 in. long, oblong, juicy.—*T. Kirk Students' Fl.* (1899) 126; *Cheesem. Man. N.Z. Fl.* (1906) 126; *Ill. N.Z. Fl.* i (1914) t. 37.

South Island: River-valleys on the western side of the Southern Alps. Heaphy River, *J. Dall;* Cobb Valley, *F. G. Gibbs!* Upper Wangapeka Valley, *R. J. Kingsley;* Buller Valley, *T. Kirk;* Lyell River, *Dr. Gaze;* Lake Brunner, *Hector!* Teremakau Valley, *T. Kirk!* Otira Valley, *Cockayne! Petrie! T. F. C.;* Lake Mapourika and Omoroa River, *Cockayne;* Arahura and Styx Valleys, *J. E. Holloway.* Altitudinal range 250–3000 ft.

A remarkably distinct species, always easily recognized by its small size, 1-foliolate leaves with sharply dentate margins, long-acuminate sepals, and large oblong fruit. Closely related to it is *R. Barkeri* (Cockayne in Trans. N.Z. Inst. xlii (1910) 326). This is based on cultivated specimens originally derived from a single wild plant—the only one known—observed by the late Mr. S. D. Barker at Inchbonny, near Lake Brunner, Westland. It is now widely spread as a cultivated plant, but during a period of 19 years only one instance has been recorded of the production of flowers. It is probably a hybrid between *R. australis* and *R. parvus.* From the latter it differs in the much larger size, in the leaves being trifoliate, not simple, and in the leaflets having their margins serrate, not dentate.

2. **GEUM** Linn.

Perennial herbs. Radical leaves crowded, often rosulate, pinnate or pinnatisect; leaflets toothed or incised, the terminal one often much larger than the others; stem-leaves usually small and bract-like. Flowers in a

terminal corymbose panicle or solitary. Calyx persistent; lobes 5, usually alternating with 5 bracteoles. Petals 5. Stamens numerous, crowded. Carpels many; ovules solitary, erect; style terminal, filiform, elongating much after flowering, bent at or below the end. Achenes numerous, compressed, crowded on a dry receptacle, each one terminated by the persistent elongated naked or plumose style.

A genus comprising about 40 species, spread through the temperate and cold regions of both the Northern and Southern Hemispheres. One of the New Zealand species is widely distributed, another occurs in temperate South America, the rest are endemic.

* Achenes villous. Flowers white except in 1 and 5.

Stem leafy, 2–3 ft. high. Flowers yellow	1. *G. urbanum.*
Leaves chiefly radical, 3–5 in. long. Panicles few-flowered. Styles longer than the achenes	2. *G. parviflorum.*
Leaves all radical, ¾–1½ in. Flowers small, in 3–5-flowered racemes. Styles shorter than the achenes	3. *G. albiflorum.*
Leaves all radical, 1–3 in. Flowers solitary, large, ¾ in. diam. Styles long	4. *G. uniflorum.*
Leaves all radical, 1–2 in. Flowers 1–5, large, ¾–1 in. diam., yellow. Styles long	5. *G. divergens.*

** Achenes glabrous. Flowers small, white.

3–6 in. high. Flowers in cymose panicles	6. *G. leiospermum.*
1–2 in. high. Flowers solitary	7. *G. pusillum.*

G. alpinum Buch. in Trans. N.Z. Inst. xix (1887) 216 is quite unknown to me, and there are no specimens in his herbarium. The original description is vague and insufficient, and the name had far better be dropped.

1. **G. urbanum** *Linn. Sp. Plant.* (1753) n. 501 var. **strictum.**—An erect sparingly branched herb 1–3 ft. high, usually softly pubescent or villous in all its parts. Radical leaves very variable in size, 4–18 in. long including the petiole, pinnate; leaflets 3–5 pairs with much smaller ones intermixed, 1–3 in. long, ovate or obovate, cuneate at the base, sessile, variously toothed lobed or pinnatifid. Cauline leaves few, smaller, with fewer and more sharply toothed leaflets, sessile or nearly so; stipules leafy, coarsely toothed or lobed. Flowers ½–¾ in. diam., yellow, few together in a loose terminal panicle; peduncles slender, erect. Calyx-lobes ovate, acuminate, reflexed in fruit. Petals obovate, exceeding the calyx. Achenes very numerous, forming a dense oblong head, spreading and recurved, hispid with long silky hairs; awn long, hooked at the tip.—*Hook. f. Handb. N.Z. Fl.* (1864) 55; *T. Kirk Students' Fl.* (1899) 128; *Cheesem. Man. N.Z. Fl.* (1906) 127. G. magellanicum *Comm. ex. Pers. Syn.* ii (1805) 57; *Hook. f. Fl. Nov. Zel.* i (1853) 55.

North and South Islands: Not uncommon from the Paparata Valley and Waikato River southward. Sea-level to nearly 3000 ft. November–January.

The New Zealand variety has a wide distribution in the Southern Hemisphere, and is found in some parts of Asia as well. It differs from the European *G. urbanum* principally in the taller and more robust habit and larger flowers.

2. **G. parviflorum** *Sm. in Rees Cyclop.* (1802) 12.—An erect or spreading perennial herb 4–18 in. high, everywhere clothed with silky or villous hairs, sometimes almost shaggy; rootstock stout, woody. Radical leaves 2–5 in. long, pinnate; terminal leaflet very large, ¾–2 in. diam., rounded-reniform, obscurely 3–5-lobed, crenate, hairy on both surfaces; lateral leaflets 4–8 pairs, all minute, deeply cut and lobed. Cauline leaves or bracts few,

small, deeply toothed. Panicles lax, few-flowered; pedicels long, slender. Flowers ½ in. diam., white. Calyx-lobes broadly ovate, obtuse or subacute. Petals broad, obtuse, longer than the calyx. Achenes very numerous, spreading, stipitate, clavate, villous; style slender, straight, villous below, glabrous and hooked at the tip, much longer than the achene.—*Hook. f. Fl. Antarct.* ii (1847) 263; *Fl. Nov. Zel.* i (1853) 56; *Handb. N.Z. Fl.* (1864) 55; *T. Kirk Students' Fl.* (1899) 129; *Cheesem. Man. N.Z. Fl.* (1906) 127.

North and South Islands: In hilly and mountain districts, from Mount Hikurangi and the Ruahine Range southwards. 1500–5000 ft. December–February. Also in South America, from Chile to Fuegia.

3. **G. albiflorum** *Cheesem. in Subantarct. Is. N.Z.* ii (1909) 403.—Pubescent, silky or villous in all its parts. Leaves all radical, ¾–1 in. long including the petiole; terminal segment orbicular-cordate or reniform, minutely lobed or crenate-toothed, pubescent and rugose beneath, silky above; lateral leaflets minute or wanting. Scape strict, downy, 2–4 in. high, with 1–3 toothed bracts. Flowers few, small, white, racemose or solitary and terminal. Calyx-tube open, silky; segments narrow, ovate, subacute; bractlets short, ovate. Petals slightly exceeding the calyx, retuse. Receptacle glabrous. Achenes stipitate, obliquely ovate, villous, compressed; style much shorter than the achene, hooked at the tip. Heads not spreading.—Sieversia albiflora *Hook. f. Fl. Antarct.* i (1844) 9, t. 7. Geum parviflorum *Hook. f. Handb. N.Z. Fl.* (1864) 55 (*in part*). G. aucklandicum *Greene in Pittonia*, iv (1895) 225. G. sericeum *T. Kirk Students' Fl.* (1899) 128; *Cheesem. Man. N.Z. Fl.* (1906) 128.

Auckland Islands: Rocky places on the hills, *Hooker;* highest part of Adams Island, 1000–2000 ft., *T. Kirk, B. C. Aston! J. S. Tennant!*

I have only seen very fragmentary specimens of this interesting plant, and have consequently availed myself of Kirk's description in the "Students' Flora." The foliage looks very different to that of *G. parviflorum*, partly owing to the upper surface being much more densely villous with long soft hairs, and to the very prominent veins of the under-surface, which give it a strongly rugose appearance.

It is not at all clear why both Greene and Kirk, in recognizing that the species was distinct from *G. parviflorum*, should have passed over Hooker's original name of *albiflorum*.

4. **G. uniflorum** *Buch. in Trans. N.Z. Inst.* ii (1870) 88.—Rootstock creeping, stout and woody, clothed with the reddish bases of the old leaves and stipules. Leaves all radical, 1–3 in. long; terminal leaflet large, ¾–1 in. diam., oblong- or rounded-reniform, obscurely lobed, deeply crenate-toothed; margins densely ciliated; surfaces with a few sparse long hairs or almost glabrous; lateral leaflets 1–2 pairs, minute, deeply toothed and ciliated. Scapes 3–6 in. high, slender, pubescent or villous; bracts 1–2, small, narrow, entire or toothed. Flower solitary, large, white, ¾–1¼ in. diam. Calyx-lobes linear-oblong, obtuse, villous with long hairs. Petals large, broadly obovate or almost orbicular. Achenes villous with long hairs, gradually narrowed into a very long style hooked at the tip.—*T. Kirk Students' Fl.* (1899) 129; *Cheesem. Man. N.Z. Fl.* (1906) 128; *Ill. N.Z. Fl.* i (1914) t. 38.

South Island: Nelson—Mount Cobb, *F. G. Gibbs!* Mount Luna, Upper Wangapeka, *R. J. Kingsley!* Mount Buckland, *W. Townson!* Discovery Peaks, Upper Waiau Valley, *H. H. Travers!* Canterbury and Westland—Mountains above Arthur's

Pass, the Otira Gorge, and the Waimakariri Glacier, *T. F. C.;* a common plant in subalpine meadows and rocky places in Westland, *Cockayne!* Otago—Eyre Mountains and Routeburn, *Poppelwell;* Mackinnon's Pass, *H. J. Matthews* and *F. G. Gibbs!* Garvie Mountains and the Takitimu Mountains, *Crosby Smith.* 3000–5000 ft. January-February.

A handsome and distinct species, easily recognized by the large white solitary flowers. (75 1945 198.)

5. **G. divergens** *Cheesem. in Trans. N.Z. Inst.* xlviii (1916) 210.—Short, stout, 2–5 in. high. Rhizome creeping, short, thick and woody, clothed with the bases of the old leaves. Leaves all radical, 1–2 in. long including the petiole, lyrate-pinnate; terminal leaflet very large, $\frac{3}{4}$–$1\frac{1}{4}$ in. diam., orbicular reniform, indistinctly lobed, coarsely crenate-dentate; margins densely ciliate with long white hairs; upper surface sparsely villous, lower almost glabrous; lateral leaflets 2–4 pairs, minute, lanceolate or ovate-lanceolate, ciliate. Scapes $1\frac{1}{2}$–3 in. high, slender, densely pubescent; bracts 2–5, the lowest sometimes $\frac{3}{4}$ in. long, lanceolate, incised or rarely inciso-pinnatifid. Flowers 1–5, large for the size of the plant, $\frac{3}{4}$–$1\frac{1}{4}$ in. diam., yellow. Calyx-lobes ovate-lanceolate, acute or acuminate, sometimes with small accessory lobes at the base, pubescent. Petals much larger, obovate, obtuse. Achenes villous with long hairs, gradually narrowed into a long glabrous style hooked at the tip.

South Island: Nelson—Sheltered places among rocks on the slopes of Mount Captain, Clarence Valley, alt. 5000 ft., *T. F. C.;* Mount Miromiro, *A. Wall* (?) (said to have white flowers).

Although this has something of the habit and appearance of *G. uniflorum*, it is by no means closely allied to that plant. The rhizome is shorter and not so stout; the leaves are thinner, with a different indumentum; the scapes are furnished with more numerous and much larger and more deeply incised bracts; the flowers are more numerous, sometimes as many as 5 to a scape, and are bright-yellow, whereas they are solitary and always white in *G. uniflorum*. I have not seen specimens of Professor Wall's plant from Miromiro, but, as it is said to have white flowers, it may belong to another species.

6. **G. leiospermum** *Petrie in Trans. N.Z. Inst.* xxvi (1894) 267.—Small, slender, 3–6 in. high, silky or villous in all its parts. Radical leaves rosulate, spreading, 1–2 in. long, pinnate; terminal leaflet $\frac{1}{3}$–$\frac{3}{4}$ in. diam., broadly ovate or rounded, sometimes obscurely lobed, closely and unequally sharply toothed; lateral leaflets 6–8 pairs, gradually diminishing towards the base of the petiole, sharply toothed or incised; cauline leaves or bracts few, deeply incised. Flowering stems few or several, erect or spreading, strict, terete, clothed with a short fine pubescence intermixed with long silky hairs, branched above, forming a few-flowered cymose panicle. Flowers small, white, $\frac{1}{4}$–$\frac{1}{3}$ in. diam.; pedicels elongating in fruit. Calyx-tube turbinate; lobes ovate-deltoid, acute. Petals small, rounded. Fruiting-receptacle silky. Achenes numerous, spreading, $\frac{1}{12}$ in. long, perfectly glabrous, oblong-ovoid, somewhat turgid, narrowed into a short hooked or spirally recurved style.—*T. Kirk Students' Fl.* (1899) 130; *Cheesem. Man. N.Z. Fl.* (1906) 128.

North Island: Reporoa Bog, Ruahine Mountains, *B. C. Aston.* South Island: Nelson—Mount Arthur Plateau, *T. F. C.;* Mount Murchison, *W. Townson!* Canterbury—Broken River, *J. D. Enys* and *T. F. C.* Otago—Upper Waipori, Mount Cardrona, The Cambrians, *Petrie!* Ben Lomond, near Queenstown, *B. C. Aston!* Garvie Mountains, *Crosby Smith;* Haast Pass and Makaroro, *Poppelwell.* Stewart Island: Not common, *Thomson! Cockayne.* 1000–4000 ft., but descends almost to sea-level in Stewart Island. December–February.

Readily distinguished from all the preceding species by the smooth and glabrous achenes narrowed into a very short recurved style.

7. **G. pusillum** *Petrie in Trans. N.Z. Inst.* xxviii (1896) 538.—Small, depressed, 1–2 in. high. Leaves few, all radical, rosulate, obovate-spathulate in outline, ¾–1 in. long, sparsely covered with rather long strigose hairs, pinnate; terminal leaflet ¼–⅓ in. broad, rounded, crenate-toothed; lateral leaflets 5–8 pairs, gradually diminishing in size, bluntly toothed. Scapes 1–2 in. high, 1-flowered, simple, naked or with 1–3 minute bracts, finely and closely pubescent. Flowers minute, white. Calyx-tube broadly [illegible] to deltoid. Petals 5–6, small, elliptic-oblong. Fruiting-

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silky above, white with appressed silvery tomentum beneath, leaflets numerous, ⅓–1 in. long, oblong or obovate or rounded, alternate ones often minute, deeply and sharply toothed or incised. Peduncles from the root-stock or rooting nodes, 2–6 in. long, 1-flowered. Flowers ½–1 in. diam., yellow. Calyx silky and villous; lobes lanceolate or oblong; bracteoles lobed and cut. Petals obovate. Achenes glabrous or nearly so; receptacle villous.—*Hook. f. Fl. Nov. Zel.* i (1853) 54; *Handb. N.Z. Fl.* (1864) 54; *T. Kirk Students' Fl.* (1899) 131; *Cheesem. Man. N.Z. Fl.* (1906) 130.

Var. *b*, **anserinoides**.—Leaflets smaller, ¼–½ in. long, sessile or petioled.—P. anserinoides *Raoul Choix* (1846) 28.

North and South Islands, Chatham Islands: Common in moist places from the Auckland Isthmus southwards, ascending to nearly 3000 ft. *Silver-weed.* December–January.

The typical form of the species is almost cosmopolitan; the var. *anserinoides*, which is often difficult to distinguish from it, is said to be endemic. It is much the most plentiful state in New Zealand.

4. ACAENA Linn. 1771.

Silky-pilose or glabrous perennial herbs; stems branched, prostrate or decumbent at the base; flowering branches scapiform, ascending or erect. Leaves alternate, unequally pinnate; leaflets toothed or incised; stipules

Pass, the Otira Gorge, and the Waimakariri Glacier, *T. F. C.*; a common plant in subalpine meadows and rocky places in Westland, *Cockayne!* Otago—Eyre Mountains and Routeburn, *Poppelwell*; Mackinnon's Pass, *H. J. Matthews* and *F. G. Gibbs!* Garvie Mountains and the Takitimu Mountains, *Crosby Smith.* 3000–5000 ft. January–February.

A handsome and distinct species, easily recognized by the large white solitary

(75 1945 198.)

504.

Bitter's Grouping of N.Z. Acaena

ANCISTRUM
LAEVIGATAE

EUANCISTRUM
ANCISTRIDIUM

SANGUISORBASTRUM

PTERACAENA

MICROPHYLLAE

Saccaticupula

hirsutula
fissistipula

sanguisorbae

glabra

microphylla
Buchanani

Die Coll. acaena. Bild. Bot. 74 (1910) 163.

6. **G. leiospermum** *Petrie in Trans. N.Z. Inst.* XXVI (1894) 201.—Small, slender, 3–6 in. high, silky or villous in all its parts. Radical leaves rosulate, spreading, 1–2 in. long, pinnate; terminal leaflet $\frac{1}{3}$–$\frac{3}{4}$ in. diam., broadly ovate or rounded, sometimes obscurely lobed, closely and unequally sharply toothed; lateral leaflets 6–8 pairs, gradually diminishing towards the base of the petiole, sharply toothed or incised; cauline leaves or bracts few, deeply incised. Flowering stems few or several, erect or spreading, strict, terete, clothed with a short fine pubescence intermixed with long silky hairs, branched above, forming a few-flowered cymose panicle. Flowers small, white, $\frac{1}{4}$–$\frac{1}{3}$ in. diam.; pedicels elongating in fruit. Calyx-tube turbinate; lobes ovate-deltoid, acute. Petals small, rounded. Fruiting-receptacle silky. Achenes numerous, spreading, $\frac{1}{12}$ in. long, perfectly glabrous, oblong-ovoid, somewhat turgid, narrowed into a short hooked or spirally recurved style.—*T. Kirk Students' Fl.* (1899) 130; *Cheesem. Man. N.Z. Fl.* (1906) 128.

North Island: Reporoa Bog, Ruahine Mountains, *B. C. Aston.* South Island: Nelson—Mount Arthur Plateau, *T. F. C.*; Mount Murchison, *W. Townson!* Canterbury—Broken River, *J. D. Enys* and *T. F. C.* Otago—Upper Waipori, Mount Cardrona, The Cambrians, *Petrie!* Ben Lomond, near Queenstown, *B. C. Aston!* Garvie Mountains, *Crosby Smith*; Haast Pass and Makaroro, *Poppelwell.* Stewart Island: Not common, *Thomson! Cockayne.* 1000–4000 ft., but descends almost to sea-level in Stewart Island. December–February.

Readily distinguished from all the preceding species by the smooth and glabrous achenes narrowed into a very short recurved style.

7. **G. pusillum** *Petrie in Trans. N.Z. Inst.* xxviii (1896) 538.—Small, depressed, 1–2 in. high. Leaves few, all radical, rosulate, obovate-spathulate in outline, ¾–1 in. long, sparsely covered with rather long strigose hairs, pinnate; terminal leaflet ¼–⅓ in. broad, rounded, crenate-toothed; lateral leaflets 5–8 pairs, gradually diminishing in size, bluntly toothed. Scapes 1–2 in. high, 1-flowered, simple, naked or with 1–3 minute bracts, finely and closely pubescent. Flowers minute, white. Calyx-tube broadly turbinate; lobes ovate-deltoid. Petals 5–6, small, elliptic-oblong. Fruiting-receptacle elongated, villous. Achenes very small, perfectly glabrous, obliquely oblong or obovoid; style minute, reduced to a recurved point.—*T. Kirk Students' Fl.* (1899) 130; *Cheesem. Man. N.Z. Fl.* (1906) 129.

South Island: Otago—Old Man Range, altitude 5000 ft., *Petrie!*

Allied to *G. leiospermum*, but separated by the much reduced size, 1-flowered scapes, smaller flowers, and minute achenes, the style of which is reduced to little more than a hooked point.

3. **POTENTILLA** Linn.

Perennial herbs, rarely shrubs. Leaves either pinnate or digitately 3–5-foliolate; stipules adnate to the petiole. Flowers solitary or in corymbose cymes. Calyx persistent, lobes 5 or rarely 4, valvate, alternating with as many bracteoles. Petals 5, rarely 4, usually broad. Stamens numerous. Disc annular or coating the calyx-tube. Carpels many, rarely few, seated on a small dry receptacle; style persistent or deciduous, terminal or lateral; ovule solitary, pendulous. Achenes usually numerous, crowded into a head surrounded by the persistent calyx.

A large genus in the arctic and temperate portions of the Northern Hemisphere, extending into the mountains of the tropics, but extremely rare in the Southern Hemisphere. The New Zealand species is almost cosmopolitan.

1. **P. anserina** *Linn. Sp. Plant.* (1753) 495.—Rootstock tufted, giving off long creeping runners rooting at the nodes. Leaves all radical, numerous, 2–6 in. long, unequally pinnate, green and glabrous or slightly silky above, white with appressed silvery tomentum beneath; leaflets numerous, ⅓–1 in. long, oblong or obovate or rounded, alternate ones often minute, deeply and sharply toothed or incised. Peduncles from the root-stock or rooting nodes, 2–6 in. long, 1-flowered. Flowers ½–1 in. diam., yellow. Calyx silky and villous; lobes lanceolate or oblong; bracteoles lobed and cut. Petals obovate. Achenes glabrous or nearly so; receptacle villous.—*Hook. f. Fl. Nov. Zel.* i (1853) 54; *Handb. N.Z. Fl.* (1864) 54; *T. Kirk Students' Fl.* (1899) 131; *Cheesem. Man. N.Z. Fl.* (1906) 130.

Var. *b*, **anserinoides**.—Leaflets smaller, ¼–½ in. long, sessile or petioled.—P. anserinoides *Raoul Choix* (1846) 28.

North and South Islands, Chatham Islands: Common in moist places from the Auckland Isthmus southwards, ascending to nearly 3000 ft. *Silver-weed.* December–January.

The typical form of the species is almost cosmopolitan; the var. *anserinoides*, which is often difficult to distinguish from it, is said to be endemic. It is much the most plentiful state in New Zealand.

4. **ACAENA** Linn. 1771.

Silky-pilose or glabrous perennial herbs; stems branched, prostrate or decumbent at the base; flowering branches scapiform, ascending or erect. Leaves alternate, unequally pinnate; leaflets toothed or incised; stipules

sheathing at the base, adnate to the petiole. Flowers hermaphrodite or unisexual, small, crowded in a terminal globose head, or (in species not native in New Zealand) into an interrupted spike. Calyx-tube obconic or turbinate, constricted at the mouth, terete or angled, naked or at length armed with simple or barbed spines; lobes 3–7, valvate, persistent or deciduous. Petals wanting. Stamens 1–10, very rarely more. Carpels 1–2, wholly immersed in the calyx-tube; style subterminal, short, exserted, dilated into a fimbriate or plumose stigma; ovule solitary, pendulous. Achenes solitary or rarely 2, enclosed in the hardened calyx (cupule) which is usually armed with subulate spines or bristles. Pericarp bony or membranous.

A genus widely spread in the temperate and montane regions of South America. Its centre of distribution is undoubtedly in the Andean districts of Chile and Peru and southwards to Fuegia; but one species is found as far north as California, another in Mexico, and a third in the Hawaiian Islands. There is also an outlying species in South Africa. The antarctic circumpolar islands contain 3 or 4 species, and 3 also occur in Australia and Tasmania. Of the 9 species admitted in this work as natives of New Zealand all but 2 are endemic. One of these (*A. adscendens*) reaches the New Zealand botanical region only in Macquarie Island.

The publication of a complete monograph of *Acaena*, written by Dr. G. Bitter, the Director of the Bremen Botanical Gardens, which took place in 1910–11, is a matter of importance to all New Zealand botanists. For the first time, it has been made possible to study the genus as a whole, and to compare the species of this country with those from abroad. The writer has found it invaluable in drawing up the following account of the New Zealand species; and, although, through the exigencies of space, he has been unable to give the same detailed treatment as that afforded by Dr. Bitter, or, in some instances, to arrive at the same conclusions, there can only be one opinion as to the value of Dr. Bitter's work as a guide for future research.

A. Ancistrum. *Spines usually 4, placed near the top of the cupule; retrorse barbs present near the summit of the spine.*

Leaves small, 1½–2½ in., glabrous or nearly so, glaucescent on both surfaces, leaflets 9–15. Stamens 2–4. Cupule laxly saccate .. .. 1. *A. saccaticupula.*

Leaves large, 2½–4 in., glabrous or nearly so above, pilose beneath, green on both surfaces, leaflets 13–15. Stamens 4 .. .. 2. *A. adscendens.*

Leaves small, 1–2 in., glaucescent on both surfaces, upper surface densely pilose; leaflets 11–15. Stamens 2 .. .. 3. *A. hirsutula.*

Leaves 1½–3 in., glaucescent on both surfaces, upper surface nearly glabrous, but a pencil of hairs at the tip of the teeth .. 4. *A. fissistipula.*

Leaves 1½–4 in., silky-pilose, green or brownish-green to rubescent above, paler below; leaflets 11–13. Heads large, ¾–1¼ in. diam. Spines purplish-red .. .. 5. *A. novae-zelandiae.*

Leaves 1–3 in. long, silky-pilose, green or brownish-green above, paler or glaucous beneath; leaflets 7–11. Heads ½–¾ in. diam. Spines green or brownish-green or rubescent .. .. 6. *A. sanguisorbae.*

B. Microphyllae. *Leaves small. Spines usually 4, placed near the top of the cupule, often flexuose, sometimes absent. Retrorse barbs few or wanting, sometimes replaced by long and thin flexuose reflexed hairs.*

Glabrous or sparingly pilose. Heads pedunculate, rarely sessile. Spines bright-red, rarely wanting, when present without retrorse barbs .. .. 7. *A. microphylla.*

Leaves pale whitish-glaucous. Heads usually sessile. Spines greenish or yellowish, furnished with reflexed flexuose hairs .. 8. *A. Buchanani.*

C. Pteracaena. *Heads large. Cupule compressed, furnished with 2 lateral wings. Spines on the cupule very short, without retrorse barbs.*

Perfectly glabrous. Heads brownish-green, sometimes suffused with red .. .. 9. *A. glabra.*

1. **A. saccaticupula** *Bitter Monog. Gattung Acaena* (1910) 173.—Stems creeping at the base, ascending above; branches numerous, suberect, leafy below. Leaves small, 1½–2½ in. long, ¼ in. broad; sheaths scarious, red-brown, glabrous, at the top passing into the frondose stipules; petiole short, glabrous, as also is the median rhachis and the whole of the lamina, with the exception of a few long hairs on the costa and near the axils of the leaflets. Leaflets 9–15, more or less glaucescent on both surfaces, sometimes with a tinge of red; lower leaflet minute, usually 3-fid; upper the largest, 7–9-fid, glabrous throughout. Fruiting-scape 5–9 in. long, usually somewhat rubescent, slender, erect. Flowers hermaphrodite. Sepals greenish suffused with purple, glabrous or with a few hairs. Stamens 2–4; anthers as long or broader than long, purplish. Cupule laxly saccate; spines always 4 major ones, usually accompanied with 1–4 of much smaller size. Stigma bilaterally plumose.

Var. **nana** *Bitter l.c.*—Smaller in all its parts, but apparently not otherwise different.

South Island: Probably not uncommon on the eastern side of the Southern Alps. Nelson—River-bed of the Upper Clarence, *C. E. Christensen.* Canterbury—Valley of the Hurunui, *A. Wall;* Broken River, *T. F. C., A. Wall;* Mount Cook district, *Petrie.* Otago—Hector Mountains, alt. 5000 ft., *Petrie.*

This is one of the plants referred to *A. adscendens* by Sir J. D. Hooker in the Handbook. But it differs from that species in its much smaller size, much more glabrous and more slender habit of growth, and in the leaves being glaucescent on both surfaces. 71(1914)86. 50(1918)185.

2. **A. adscendens** *Vahl. Enum.* i (1804) 294. Stems stout, procumbent, 12–20 in. long; branches ascending, glabrous, reddish-purple or rubescent. Leaves 2½–4 in. long; stipules large, ¾ in. long or more, sheathing, purplish-red; laminae ⅓–2 in. long, 6–7-foliolate, obovate or obovate-oblong, obtuse, deeply and coarsely serrate-dentate, firm in texture but not coriaceous; lower pairs much reduced in size, sometimes almost petioled, the upper 2 or 3 pairs the largest, ⅓–½ in. long, rarely more, green on both sides, upper surfaces glabrous or very slightly pilose, lower surface or rhachis pilose with silky hairs. Scape 3½–5½ in. long; stout, erect, smooth and glabrous, reddish-purple. Flowers hermaphrodite in all the specimens seen by me. Sepals 4, oblong, obtuse or subacute, sparingly pilose on the outside, ¼ in. long. Anthers 4, filaments exceeding the sepals when mature, broadly oblong, $\frac{1}{20}$ in. long, dark-purple. Spines 4, subequal, ½–⅔ in. long, exceeding the sepals, furnished with yellowish barbs at the top, shaft smooth, dark-purple. Stigma bilaterally plumose, ⅓ in. long.—*Hook. f. Fl. Antarct.* i (1844) 10; ii (1847) 268, t. 96; *Handb. N.Z. Fl.* (1864) 56 (*excl. the N.Z. localities*); *T. Kirk Students' Fl.* (1899) 133 (*in part*); *Cheesem. Man. N.Z. Fl.* (1906) 132 (*in part*); *Vascl. Fl. Macquarie Is.* (1919) 21; *Bitter Monog. Gattung Acaena* (1910) 175.

Macquarie Island: Common on the lower grounds, and on hillsides near the sea, *Fraser, Scott, A. Hamilton! H. Hamilton!*

A. adscendens is a widely distributed species outside New Zealand. It is found in Patagonia, Fuegia, Falkland Islands, Kerguelen Island, Crozets, and South Georgia. Certain specimens from the mountains of the South Island of New Zealand were referred to it by Hooker in the Handbook, but these are now considered to be distinct. Bitter, in his recently published monograph, has described them as new specie, under the names of *A. saccaticupula, A. hirsutula,* and *A. fissistipula,* under which names they will be found in this work.

3. **A. hirsutula** *Bitter Monog. Gattung Acaena* (1910) 246.—Stems slender, creeping, branched above; branches suberect. Leaves 1–2 in.

A. fissistipula var. rubristyma Bitter
Feed. Rep. 495.

long; sheaths passing into lanceolate or broadly ovate stipules which are simple or 2–3-fid; petiole and median rhachis furnished with laxly or densely set hairs. Leaflets 11–15; the lower ones entire or 2–3-fid; the upper obovate, obtuse, 13–16-dentate; the whole lamina greyish-glaucescent on both surfaces, the upper surface a little greener and laxly clothed with appressed hairs; under-surface densely hairy throughout, especially on the primary and secondary veins, pilose on the margins, but no pencils of hairs on the apices of the teeth. Scape erect, pilose with crisped hairs which are most abundant and appressed just below the capitulum, which is ⅓ in. diam. Sepals 4, almost glabrous. Stamens 2; anthers reniform, broader than long, purplish. Spines 4, armed at the tip with 5–7 barbs.

Var. **hirticupula** *Bitter l.c.*—Larger and coarser; leaves 1½–2 in. long; stipules broader. Scape 6 in. high. Cupule hirtulose.

Var. **glabricupula** *Bitter l.c.*—Smaller and more compactly branched; leaves smaller, ¾–1½ in. long. Cupule nearly glabrous.

South Island: Canterbury—According to Bitter, both varieties collected by Cockayne at Trelissick, Broken River basin, alt. 2100 ft.

I have not identified this species, and, in the absence of other information, the above description is condensed from that given in Bitter's monograph. According to him, it is one of the species included by Hooker in his circumscription of *A. adscendens*.

4. **A. fissistipula** *Bitter Monog. Gattung Acaena* (1910) 247.—Stem small, slender, creeping; branches ascending or suberect, glabrous or nearly so, more or less rubescent. Leaves mostly on the creeping stem, 1½–3 in. long; stipules short, 3–5-fid, glabrous except a pencil of hairs at the tip of the lobes; petiole and median rhachis more or less pilose with whitish hairs. Leaflets 9–13; lowest pair very small, entire or 3-fid; following pairs gradually larger, uppermost leaflet the largest, orbicular or nearly so, ⅓ in. diam.; deeply 7–13-toothed; the whole lamina glaucescent on both surfaces, sometimes faintly rubescent on the margins, upper surface glabrous or nearly so, under-surface appressed-pilose on the veins, a dense pencil of hairs on the tips of the teeth. Scapes 5–7 in. long, naked or with a very minute leaflet, rubescent, below almost glabrous, in the upper portion densely covered with appressed-pilose hairs. Flower-head ½ in. diam., reddish-purple. Sepals 4, green suffused with purple, pilose without; cupule densely pilose; spines 4. Stamens 2; anthers purple, reniform, a little broader than long. Stigma bilaterally plumose.

South Island: Canterbury—Broken River basin, alt. 2500 ft., *T. F. C.* Otago—Hector Mountains, alt. 5000 ft., *Petrie* (quoted in Bitter's monograph).

This appears to be a sufficiently well-marked species, although doubtless closely allied to *A. hirsutula*. The dense pencils of whitish hairs terminating the teeth of the leaves and the pilose calyx are very curious characters. I have been acquainted with it for many years, but, like most New Zealand botanists, have treated it and other allied plants as a variety of *A. adscendens*. Bitter describes two varieties—*longibracteata*, in which the bracts of the capitulum exceed the flowers, and *brevibracteata*, in which the bracts are shorter than the flowers. But the last-mentioned variety is only known in cultivation in England and Germany.

5. **A. novae-zelandiae** *T. Kirk in Trans. N.Z. Inst.* iii (1871) 177.—Stem long, creeping and rooting, stout and woody at the base; branches leafy, ascending at the tips, more or less silky-pilose, often rubescent.

Leaves 1½–3 in. long; stipules lanceolate, erect, 2–3-fid; petiole and rhachis usually more or less pilose, sometimes densely so; leaflets 11 to 13 (5 to 6 pairs with a terminal one), the lowest pair minute; uppermost pair the largest, ⅓–⅔ in. long, oblong or elliptical, coarsely serrate-dentate; the leaflets as a rule green or brownish-green above, more or less glaucous beneath; upper surface nearly glabrous, under-surface with appressed silky hairs on the veins and margins. Scapes terminating the branches, 2–6 in. long, rarely more, stout, erect, often purplish-red. Heads globose, large, ¾–1¼ in. diam., purplish-red. Sepals 4, densely pilose; spines 4, barbs usually paler than the spines. Stamens 2; anthers reniform, as broad as long. Stigma bilaterally plumose.—*Students' Fl.* (1899) 133; *Cheesem. Man. N.Z. Fl.* (1906) 131; *Ill. N.Z. Fl.* i (1914) t. 39. A. macrantha *Col. in Trans. N.Z. Inst.* xxiii (1891) 383.

Var. **viridissima** *Bitter Monog. Gattung Acaena* (1910).—Leaflets subserrate-crenate, bright dark-green above, glabrous.

Var. **subtusglaucescens** *Bitter l.c.*—Leaflets inciso-dentate, green above (but not so dark-green as *viridissima*), almost wholly glabrous; teeth sparingly pilose; under-surface much paler, cinereous-glaucous.

Var. **pallida** *T. Kirk Students' Fl.* (1899) 134; *Cockayne in Trans. N.Z. Inst.* xlviii (1916) 193.—Much stouter and coarser, sometimes over 2 ft. long. Leaves often 3–4 in., pale yellow-green. Heads very large, 1½ in. diam. Spines bright pinkish-purple, seldom green.

North and South Islands, Stewart Island: Not uncommon throughout in open places. Sea-level to 2000 ft. Var. *pallida:* Sand-dunes at Lyall Bay, Wellington, *T. Kirk!*

Bitter, in his monograph of the genus, reduces Kirk's *A. novae-zelandiae* to the rank of a subspecies of *A. sanguisorbae*, thus associating it with his subspecies *caesiiglauca*, *profundeincisa*, and *pusilla*, together with various Australian plants. But I have always regarded *A. novae-zelandiae* as fully entitled to the rank of a species; and, so far as the other subspecies mentioned above are concerned, I am in agreement with Cockayne, who says that it is simpler to treat *A. novae-zelandiae* as "an aggregate species, and to reduce all Bitter's other New Zealand endemic subspecies to the rank of varieties."

A. anserinaefolia (Forst) Druce hond Cat. p. 36.

6. **A. sanguisorbae** *Vahl. Enum. Plant.* i (1804) 294.—Stems long, creeping and rooting, almost woody at the base, much branched; branches leafy, ascending or erect above, more or less silky-pilose. Leaves variable in size, 1–3 in. long; stipules erect, 2–5-fid; petioles and rhachis usually clothed with appressed silky hairs; leaflets 7–11 (4–5 pairs with a terminal one), rarely more; lowermost pair minute, entire or deeply incised, uppermost pair the largest, ¼–⅔ in. long, oblong or obovate, obtuse, deeply toothed or serrate; leaflets usually brownish-green above, paler beneath, sometimes glaucous; upper surface almost glabrous or sparingly pilose; under-surface always densely appressed-pilose, especially upon the veins. Scapes terminating the branches, 4–6 in. long or more, naked or with a few minute leaflets, shortly pilose or almost glabrous, brownish or reddish-brown. Head globose, ½–¾ in. diam. in fruit, brownish or brown suffused with red. Sepals 4, persistent in fruit. Stamens 2, anthers whitish. Spines 4, barbed at the summit.—*A. Cunn. Precur.* (1839) n. 566; *Raoul Choix* (1846) 49; *Hook. f. Fl. Nov. Zel.* i (1853) 54; *Handb. N.Z. Fl.* (1864) 56; *Benth. Fl. Austral.* ii (1864) 434; *T. Kirk Students' Fl.* (1899) 133; *Cheesem. Man. N.Z. Fl.* (1906) 131. Ancistrum anserinaefolium *J. R. Forst. et G. Forst. Char. Gen.* (1776) 4, t. 2. A. diandrum *Forst. f. Prodr.* (1786) n. 52.

A. ans. var. antarctica (Cham.) Druce 1916: 602.

A. sanguis. " " (Cham.) Bitter 2nd. Rep.

var. sericeo-viten Bitter. T. 56 (1926) 21.
" paracaulens - Fedde Rep. 486.
" diminuta - " " 496.

Var. **pilosa** *T. Kirk Students' Fl.* (1899) 133.—Leaflets greyish-glaucous on both sides with appressed silky hairs. Probably the same as Bitter's subspecies *caesiiglauca*, of which I have seen no authenticated examples. It is an abundant plant in the mountains of the South Island.

Var. **profundeincisa** *Bitter Monog. Gattung Acaena* (1910).—Leaflets deeply incised, glaucous-green above, greyish-glaucous beneath. (Described from cultivated plants; but a variety called *sericenitens* has been collected at Kelly's Hill, Otira Valley, by Cockayne.)

Var. **pusilla** *Bitter Monog. Gattung Acaena* (1910).—Smaller than the type. Leaves 1–1½ in. long; leaflets 9–11, green above, often a little olive-brown, more or less pilose. Mature spines ⅓ in. long, greenish-yellow suffused with red. NORTH AND SOUTH ISLANDS: Not uncommon.

Var. **viridior** *Cockayne in Trans. N.Z. Inst.* xlviii (1916) 193.—Leaves green above, never a little olive-brown; calyx-lobes and spines pale-green. Of this Cockayne remarks (*l.c.*), "distinguished from the extremely common var. *pusilla* by its larger bright-green leaves, which have never brown basal leaflets, and the pale- but clear-green calyx-segments and spines, whereas the small basal leaflets of the var. *pusilla* are more or less deeply stained with brown, and the spines are pale and stained here and there with light-red." The following localities are known: NORTH ISLAND—Taranaki and near Wellington. SOUTH ISLAND—Nelson Waterworks, Banks Peninsula, near Kaikoura.

Var. **minor** *Hook. f. Fl. Antarct.* i (1844) 9; *Cockayne in Trans. N.Z. Inst.* xlix (1917) 56; *Cheesem. Vasc. Fl. Macquarie Is.* (1919) 22.—Stem long, stout, creeping; branches short, ascending, often rubescent. Leaves 1½–3 in. long, pale-green above, beneath densely clothed with appressed silky hairs. Scape short and stout, 1–2½ in. long. Head ½ in. diam.; colour ranging from stramineous to pale rubescent.—A. sanguisorbae *Vahl. var.* antarctica *Cockayne in Trans. N.Z. Inst.* xxxvi (1904) 319; A. sanguisorbae *Vahl. var.* aucklandica *Bitter Monog. Gattung Acaena* (1910) 274.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: The ordinary state of the species abundant from the North Cape to Stewart Island and Chatham Islands; *var. minor* confined to the AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND, AND MACQUARIE ISLAND. Sea-level to 3500 ft. *Piripiri; Burr.* November-February.

Bitter makes several changes of importance in the circumscription of *A. sanguisorbae* which he divides into 3 separate species—(1) A restricted *A. sanguisorbae*, which includes all the varieties found in Australia, Tasmania, and New Zealand; (2) *A. insularis, literne*, from New Amsterdam; and (3) *A. sarmentosa*, from Tristan d'Acunha. The Australian forms are placed under 8 subspecies, all endemic. The New Zealand forms are also considered to be distinct. I regret that from want of specimens I have been unable to deal with 3 varieties from Chatham Islands obtained by the German collector Krull many years ago.

T. 36 (1904) 319 & 49 (1917) 56.

7. **A. microphylla** *Hook. f. Fl. Nov. Zel.* i (1853) 55.—Stems stout, prostrate, much and widely branched, often forming extensive patches; flowering branchlets short, erect, glabrous or nearly so. Leaves variable in size, ¾–2 in. long, sparingly pilose or almost glabrous; leaflets 7–13 (3–6 pairs with a terminal leaflet), the lowermost pair minute; the following pairs gradually increasing in size, the uppermost pair or the terminal leaflet the largest, ⅛–⅕ in. long, broadly obovate or almost orbicular, membranous, crenate-dentate or serrate; colour variable, glaucescent to olive-green or dark brownish-green. Heads globose, ⅓–¾ in. diam. when mature, usually borne on scapes ½–3 in. long, rarely sessile. Calyx-tube (cupula) silky or glabrous, tetragonous, turbinate when mature, usually but not invariably furnished at the angles with 4 bright purplish-red spines devoid of barbs; achenes 2. Stamens 2; anthers 2, whitish or yellowish. —*Handb. N.Z. Fl.* (1864) 56; *T. Kirk Students' Fl.* (1899) 134; *Cheesem. Man. N.Z. Fl.* (1906) 132; *Bitter Monog. Gattung Acaena* (1910).

T. 57 (1926) 21.
71 (1941) 87.
59 (1929) 725.

Var. **inermis** *T. Kirk Students' Fl.* (1899) 134.—Leaves longer, 1–4 in. long, usually glaucous; leaflets $\frac{1}{6}$–$\frac{1}{3}$ in. long. Fruiting-calyx without any spines.—A. inermis *Hook. f. Fl. Nov. Zel.* i (1853) 54; *Handb. N.Z. Fl.* (1864) 57. Bitter describes 2 forms differing in the length of the scape.

Var. **depressa** *T. Kirk l.c.*—Smaller; branches closely appressed to the ground. Heads small, 5–7-flowered, sessile, almost hidden by the leaves.—A. depressa *T. Kirk in Trans. N.Z. Inst.* ix (1877) 548.

Var. **pauciglochidiata** *Bitter Monog. Gattung Acaena* (1910).—Differs from all the forms of the section *Microphyllae* in the very thin spines furnished at the tip with 1–3 unilaterally placed barbs. South Island: Near Invercargill, *Petrie.*

North and South Islands: Not uncommon from the Ruapehu and the Ruahine Mountains southwards, mainly in mountain districts. Var. *inermis:* In similar situations from Nelson to the south of Otago. Var. *depressa:* Otago—Cardrona Valley, Petrie! Lake Hawea, T. Kirk! Sea-level to 3500 ft. November–January.

8. **A. Buchanani** *Hook. f. Handb. N.Z. Fl.* (1864) 57.—Stems and branches numerous, prostrate and rooting, sometimes almost subterranean; branchlets short, thick, erect, the younger ones densely pilose. Leaves variable in size, $\frac{1}{2}$–$\frac{3}{4}$ in. long, the sheaths produced into short stipules; leaflets 11–13 (5–6 pairs with a terminal leaflet), the lowermost pair minute, the following pairs gradually increasing in size, the uppermost leaflet the largest, $\frac{1}{8}$–$\frac{1}{6}$ in. long, obovate to nearly orbicular, deeply crenate-dentate; all the leaflets whitish-green on both surfaces, more or less pilose. Head altogether sessile or on a very short scape, 5–10-flowered. Sepals 4, green, persistent in fruit; calyx-tube (cupula) turbinate, densely villous, 4-angled; each angle provided with a greenish or yellow spine; each spine furnished near the tip with several scattered more or less flexuose reflexed hairs. Stamens 2, rarely more; anthers yellowish. Achenes 1 or 2.—*T. Kirk Students' Fl.* (1899) 134; *Cheeseman. Man. N.Z. Fl.* (1906) 133; *Bitter Monog. Gattung Acaena* (1910).

Var. **inermis** *Bitter l.c.*—Cupula bearing at the apex of the angles a prominent tubercle; spines wanting.

South Island: Otago—Lake district, *Hector* and *Buchanan!* Upper Clutha Valley, Lake Hawea, *Petrie!* Var. *inermis:* Mount Ida Valley, *Cockayne.*

A distinct little species, easily recognized by the small size, whitish-green colour, villous leaves and branches, small sessile heads, and yellowish spines.

9. **A. glabra** *Buch. in Trans. N.Z. Inst.* iv (1872) 226, t. 14.—A wide-creeping, stout and woody, perfectly glabrous plant; stems 1–2 ft. long. Branches numerous, leafy, ascending or suberect. Leaves $\frac{3}{4}$–$1\frac{1}{4}$ in. long; stipules lanceolate, acute; petiole very short; leaflets 7–11 (3–5 pairs with a terminal one), the lowermost pair minute, quite close to the stipules; uppermost pair the largest, $\frac{1}{5}$–$\frac{1}{3}$ in. long, broadly oblong or oblong-obovate, sometimes cuneate at the base, deeply and coarsely toothed; the leaflets as a rule green or brownish-green above, sometimes suffused with red, pale-green or glaucous-green beneath, always glabrous. Scapes terminating the branches, stout, erect, 2–5 in. long, naked or sometimes furnished with a minute leaf near the middle. Head globose, $\frac{1}{2}$–$\frac{3}{4}$ in. diam., green or sometimes suffused with purplish-red. Flowers most commonly bisexual, but occasionally unisexual or polygamous. In the bisexual flowers the stamens are 2 only; while in the male flowers

the stamens vary from 20 to 40. Calyx-tube much compressed, 4-winged; the lateral wings much larger, produced upwards and outwards; the 2 remaining wings always smaller and less prominent. Sepals 4, broadly ovate, persistent, green, sometimes red; below the sepals are 4 minute spines without barbs.—*T. Kirk Students' Fl.* (1899) 134; *Cheesem. Man. N.Z. Fl.* (1906) 133; *Bitter Monog. Gattung Acaena* (1910).

South Island: Nelson—Wairau Gorge, *Rough, T. F. C.;* Upper Clarence Valley, *T. Kirk, T. F. C.;* Lake Guyon, *H. H. Travers!* Lake Tennyson, *R. M. Laing.* Marlborough—Mount Mouatt and Awatere Valley, *T. Kirk!* Canterbury—Mount Torlesse, *Petrie!* Broken River, *T. F. C.;* Mount Cook district, *T. F. C.* Otago—Mount Ida, *Petrie!* mountains above Lake Harris, *T. Kirk;* Mackinnon's Pass, *F. G. Gibbs!* Routeburn, *Poppelwell.* 2500–4500 ft.

T. 71 (1941) 87.

A very remarkable plant, at once recognized by the almost perfectly glabrous habit, large apparently unarmed heads, and the laterally winged and much-compressed fruiting calyx-tube.

The occasional production in this species of unisexual flowers in which the males contain as many as 30–40 stamens is a matter that should be inquired into. The peculiarity was first detected by Mr. T. Kirk in some specimens collected in the Clarence Valley, and I still possess a specimen given to me by him in which it is clearly shown. But I have failed in obtaining any additional examples.

Family LI. **LEGUMINOSAE.**

Herbs, shrubs, or trees, of very various habit. Leaves usually alternate, stipulate, compound, rarely simple, sometimes wanting. Flowers generally irregular, hermaphrodite, occasionally regular and polygamous. Sepals 5, usually cohering into a more or less deeply divided calyx, sometimes free, often unequal, occasionally 2-lipped. Petals 5, seldom fewer, perigynous or rarely hypogynous, either papilionaceous or more or less regularly spreading. Stamens 10, rarely less or more, perigynous or almost hypogynous; filaments either free or all connate into a tube surrounding the ovary, or more generally 9 of them united and 1 free. Ovary free, 1-celled, consisting of a single carpel; style simple; ovules 1 to many, attached to the ventral suture. Fruit a pod splitting open along both sutures, rarely indehiscent or transversely breaking up into 1-seeded joints. Seeds nearly always exalbuminous; embryo with large foliaceous or amygdaloidal cotyledons and a short radicle.

With the exception of *Compositae*, this is the largest family of flowering plants, comprising 500 genera and about 12,000 species. Next to *Gramineae*, it is the most serviceable to man for food; and it produces more substances used in the arts and medicine than any other family. Its distribution is practically world-wide; but it is singularly rare in New Zealand, the proportion of species being much smaller than in any other country of equal size. In fact, the paucity of *Leguminosae* is one of the most remarkable peculiarities of the New Zealand flora, especially taking into account that the family is the one most strongly developed in Australia, the nearest land area to New Zealand. Of the 8 indigenous genera, *Carmichaelia* has an outlying species in Lord Howe Island, but is otherwise restricted to New Zealand; while the 3 closely allied genera *Corallospartium, Chordospartium,* and *Notospartium* are endemic. *Clianthus* has 1, or perhaps 2, species in Australia, and 1 in the Malay Archipelago; *Swainsona* is largely represented in Australia; while *Canavalia* and *Sophora* are widely distributed in warm climates. A list of the naturalized species, with references to descriptions, will be found in the appendix.

Subfamily PAPILIONACEAE.

All the indigenous genera belong to this subfamily, which is characterized as follows: Corolla irregular and papilionaceous, seldom almost regular. Petals imbricate, the uppermost (or standard) always outside in the bud. Stamens definite, usually 10.

* Shrubs, sometimes very small; branches flattened, compressed or nearly terete, grooved or striate, leafless or nearly so when adult.

Branches stout, terete, deeply grooved. Pods compressed, 1-seeded, dehiscing along the sutures	1. Corallospartium.
Branchlets compressed or terete. Pods short, few-seeded; valves falling away from the persistent thickened sutures, to which the seeds remain attached, or rarely the pod is indehiscent ..	2. Carmichaelia.
Branchlets terete or subcompressed, slender, pendulous. Pods short, $\frac{1}{5}$ in. long, orbicular-rhomboid. Seed solitary ..	3. Chordospartium.
Branchlets terete or compressed, slender, pendulous. Pods narrow-linear, torulose, 2–10-seeded, indehiscent	4. Notospartium.

** Branches not flattened nor compressed, leafy.

Shrub. Racemes pendulous; flowers large, crimson. Pod terete, many-seeded	5. Clianthus.
Small alpine herb. Racemes erect. Pod membranous, inflated	6. Swainsona.
Large twiner. Leaves 3-foliolate. Calyx 2-lipped. Stamens monadelphous. Pod large and broad	7. Canavalia.
Tree or shrub. Leaves pinnate with many leaflets. Racemes pendulous. Flowers large, yellow. Stamens free. Pod moniliform	8. Sophora.

1. **CORALLOSPARTIUM** J. B. Armstrong. 1881.

A leafless shrub. Stems and branches stout, cylindric, deeply grooved. Flowers in dense fascicles at the notches of the branchlets. Calyx woolly, campanulate, 5-toothed; teeth about equal. Standard large, broad, reflexed, contracted into a short claw. Wings falcate, oblong, obtuse, auricled towards the base, shorter than the keel. Keel about equalling the standard, incurved, oblong, obtuse. Upper stamen free, the others connate into a sheath. Ovary densely villous; style silky at the base; ovules 2–4. Pod 2-valved, deltoid, rounded and winged at the back, straight in front, shortly beaked, villous; valves thin, faintly reticulated, edges not thickened nor consolidated into a replum. Seed solitary or rarely 2, reniform; radicle with a double flexure.

A genus of a single species, endemic in New Zealand. It is technically separated from *Carmichaelia* by the 2-valved pod without a persistent replum.

(Hooker. 8.)

1. **C. crassicaule** *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 333.—Stems erect, 1–6 ft. high, $\frac{1}{3}$–$\frac{3}{4}$ in. diam., sparingly branched, yellow, stout, erect, cylindrical, with numerous parallel tomentose grooves; branchlets compressed at the tips. Leaves rarely seen on mature plants, when present very fugacious, small, linear-oblong or ovate-oblong; of young plants broadly oblong or almost orbicular, entire or emarginate. Fascicles capitate, densely 8–20-flowered; pedicles short, slender, and with the calyces softly woolly. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. long, cream-coloured. Pod $\frac{1}{4}$ in. long, indehiscent.—*T. Kirk Students' Fl.* (1899) 106; *Cheesem. Man. N.Z. Fl.* (1906) 108; *Ill. N.Z. Fl.* i (1914) t. 31. Carmichaelia crassicaulis *Hook. f. Handb. N.Z. Fl.* (1864) 48.

(x) Var. **racemosa** *T. Kirk Students' Fl.* (1899) 107.—Branchlets narrower, $\frac{1}{8}$ in. broad, compressed. Flowers less than $\frac{1}{4}$ in. long, solitary or in 3–5-flowered racemes, which are solitary or fascicled. Pedicels and calyx not so woolly.

T. 57 (1926) 50 & 73 (1943) 155.

C. racemosa (Kirk). Cheesem. & Allan. 57 (1926) 50.

SOUTH ISLAND: Canterbury—Mount Torlesse, *Haast!* Lake Lyndon, *J. D. Enys! T. F. C.!* Mount Hutt, *Cockayne;* Mount Dobson and other mountains flanking the Mackenzie Plains, *T. F. C.;* Lake Ohau, *Haast.* Otago—Lindis Pass, *Hector* and *Buchanan;* Naseby and westwards to the Dunstan Mountains, *Petrie!* Kurow Mountains, *H. J. Matthews!* Hector Mountains, *W. Wilcox;* Lake Wanaka, *Cockayne.* 1500–4000 ft. *Coral Broom.* December–January.

One of the most remarkable plants in the Dominion; at once recognized by the robust deeply grooved branchlets, densely fascicled flowers, and woolly calyx. It appears to be confined to arid situations on the eastern slopes of the Southern Alps.

2. **CARMICHAELIA** R. Br. 1825.

Erect or depressed shrubs, some species attaining a height of 6–10 ft., others reduced to broad matted patches hardly rising more than an inch or two above the ground. Branchlets flattened or terete, grooved or striate, green. Leaves often absent, except in seedlings; when present deciduous after the flowers have fallen, 1-foliolate or pinnately 3–5-foliolate. Flowers small, in lateral racemes springing from notches on the edges of the branchlets, rarely solitary. Calyx campanulate or cup-shaped, 5-toothed. Standard orbicular, usually reflexed, contracted into a short claw. Wings more or less falcate, oblong, obtuse, auricled towards the base. Keel oblong, incurved, obtuse, shorter or longer than the standard. Upper stamen free, the others connate into a sheath. Ovary narrowed into a slender beardless style; stigma minute, terminal; ovules numerous. Pod small, coriaceous, narrow-oblong to almost orbicular, straight or oblique, compressed or turgid, narrowed into a short or long subulate beak; valves with the edges thickened and consolidated, forming a kind of framework called the replum, from which the faces of the valves come away; or in a few species the valves remain attached to the replum and the pod is indehiscent. Seeds 1–12, reniform or oblong; radicle usually with a double fold.

A very remarkable genus, confined to New Zealand, with the exception of one species found in Lord Howe Island. Its habit is peculiar, most of the species being leafless or nearly so when mature, the green flattened or terete branchlets (cladodes) performing the functions of true leaves. The structure of the pod is most exceptional, the margins of the valves and placentas being thickened and consolidated into a framework (replum), to which the seeds are attached. In dehiscence the faces of the valves either come away altogether from the replum, which may persist for a long time with the seeds hanging from it, or the valves may separate at one side or end, remaining attached at the other. In the four species constituting the section *Huttonella* the valves do not usually separate from the replum, which is frequently incomplete, and the pod is thus indehiscent. Had this character been constant, *Huttonella* might well have been kept as a distinct genus, as proposed by Kirk. But fruiting specimens of *C. juncea* in Mr. Colenso's herbarium show that the valves occasionally separate from the replum in that species, and Mr. Petrie informs me that the same thing occurs in his *C. compacta.*

The discrimination of the species is probably more difficult in *Carmichaelia* than in any other genus in the New Zealand flora, and the student will find it almost impossible to name his specimens with accuracy until he has collected most of the species and become familiar with their characters. In most cases characters based upon the vegetative organs are by themselves useless. The leaves, when they can be examined, are singularly uniform; and the branchlets are not only highly variable in width, but may be flattened in spring and nearly terete in autumn. The flowers vary in size and colour in the different species, but present no important structural modifications. The pods afford the most trustworthy characters, and in several cases are quite sufficient for the identification of the species. The following analysis of the species is in many respects imperfect, and will doubtless require considerable modification. A really comprehensive and accurate account cannot be drawn up until the species have been carefully studied in the field at different seasons of the year, and in all stages of

growth. It is specially important, in order to form a safe basis for future work, that flowering and fruiting specimens should be taken from the same plant.

A. Much depressed leafless plants forming matted patches 1–4 in. high. Flowers usually reddish.

* Branchlets thin, linear or narrow-linear.

Flowers solitary or racemose. Pods obliquely ovate-orbicular, usually 1-seeded .. .. 1. *C. Enysii.*
Flowers solitary; peduncles long. Pods 3–4-seeded .. .. 2. *C. uniflora.*
Flowers racemose. Pods 3–6-seeded .. .. .. 3. *C. nana.*

** Branchlets very stout and thick, flattened, with rounded edges.

Flowers racemose. Pods large, turgid, 6–14-seeded .. .. 4. *C. Monroi.*

B. Erect or spreading shrubs 1–10 ft. high. Flowers usually purplish or streaked with purple, rarely white. Valves of the pod separating from the persistent replum.

* Usually leafless when mature (sometimes leafy in 8, *C. subulata*).

† Branchlets broad, flat, and thin.

Branchlets $\frac{1}{3}$–$\frac{1}{2}$ in. broad. Flowers large, $\frac{3}{4}$–1 in. Pod 1 in., turgid 5. *C. Williamsii.*
Branchlets $\frac{1}{5}$–$\frac{1}{3}$ in. Flowers small, $\frac{1}{8}$–$\frac{1}{6}$ in. Pods $\frac{1}{3}$–$\frac{1}{2}$ in.; valves slightly convex. Seeds red .. .. 6. *C. australis.*

†† Branchlets narrow, terete, plano-convex or compressed.

Branchlets very stout, often terete, $\frac{1}{12}$–$\frac{1}{8}$ in. diam. Pod $\frac{1}{4}$–$\frac{1}{2}$ in., turgid. Seeds 2–6 .. .. 7. *C. Petriei.*
Branchlets slender, compressed or plano-convex, $\frac{1}{20}$–$\frac{1}{10}$ in. diam. Pod $\frac{1}{4}$–$\frac{1}{3}$ in., turgid, subulate, acuminate. Seeds usually 2 .. 8. *C. subulata.*
Branchlets slender, terete or plano-convex, $\frac{1}{15}$–$\frac{1}{10}$ in. diam. Pod $\frac{1}{3}$ in., oblong, turgid, narrowed below .. .. .. 9. *C. virgata.*
Branchlets very slender, almost filiform. Pod small, $\frac{1}{6}$–$\frac{1}{5}$ in., obliquely oblong. Seed 1, rarely 2 .. .. .. 10. *C. diffusa.*

** Usually leafy in spring and early summer (sometimes leafless in *C. flagelliformis*).

† Pod conspicuously turgid.

Stems slender, often twining. Branchlets almost filiform, grooved. Flowers large, $\frac{1}{3}$–$\frac{1}{2}$ in. Pod elliptic, beak very long .. .. 11. *C. gracilis.*

†† Pod more or less compressed, or only slightly convex.

Branchlets glabrous, deeply grooved, erect. Racemes 5–12-flowered. Flowers large, $\frac{1}{4}$ in. Pod oblong, beak rather long 12. *C. grandiflora.*
Branchlets pubescent, compressed, drooping. Racemes 10–12-flowered. Flowers small, $\frac{1}{8}$–$\frac{1}{6}$ in. Pod oblong, narrowed into a long beak .. .. 13. *C. odorata.*
Branchlets glabrous, compressed or terete. Racemes 10–40-flowered. Pod narrowed into a long beak .. .. .. 14. *C. angustata.*
Branchlets slender, grooved, often fastigiate. Racemes 3–7-flowered. Flowers small. Pod obliquely ovate, suddenly narrowed into a long beak .. .. 15. *C. flagelliformis.*
Branchlets filiform, leafless. Flowers small. Pod elliptic-oblong, $\frac{1}{3}$ in. long, compressed; seeds seldom more than 2 .. .. 16. *C. paludosa.*
Small prostrate shrub, leafless. Pods small, $\frac{1}{10}$–$\frac{1}{8}$ in., conspicuously turgid; seeds 3–4 .. .. 17. *C. Fieldii.*

C. Huttonella. *Erect or prostrate shrubs 1–4 ft. high. Flowers small. Pod small, usually indehiscent, swollen, often broader than deep; beak turned abruptly upwards.*

* Leafless when mature.

Erect. Branchlets numerous, terete. Racemes lax. Flowers $\frac{1}{5}$ in. .. .. 18. *C. compacta.*
Erect. Branchlets few, terete. Racemes dense. Flowers $\frac{1}{6}$ in... 19. *C. curta.*
Erect or prostrate. Branchlets terete or compressed. Racemes dense. Flowers $\frac{1}{10}$–$\frac{1}{8}$ in. .. .. 20. *C. juncea.*

** Leafy when mature.

Prostrate. Branchlets compressed .. .. 21. *C. prona.*

1. **C. Enysii** *T. Kirk in Trans. N.Z. Inst.* xvi (1884) 379, t. 30.—A much-dwarfed depressed excessively branched glabrous plant, forming dense patches 1–2 in. high; stems and lower branches thick and woody, matted. Branchlets small, $\frac{1}{3}$–$\frac{3}{4}$ in. long, $\frac{1}{25}$–$\frac{1}{10}$ in. broad, erect or suberect, compressed, thin, striate. Leaves of young plants orbicular, emarginate. Flowers minute, $\frac{1}{6}$–$\frac{1}{4}$ in. long, solitary or in 3–6-flowered fascicles or racemes; pedicels slender, usually silky. Calyx campanulate; teeth short, acute. Standard with a narrow claw; wings as long as the keel. Pod $\frac{1}{5}$–$\frac{1}{3}$ in. long, compressed, ovate-orbicular, often oblique, sometimes obliquely deltoid; replum incomplete; beak stout, broad at the base, recurved. Seed usually 1, rarely 2–3.—*Students' Fl.* (1899) 108; *Cheesem. Man. N.Z. Fl.* (1906) 111.

Var. **orbiculata** *T. Kirk l.c.*—Larger and stouter, 2–4 in. high; branchlets $\frac{1}{6}$ in. broad. Pods with rugulose valves.—C. orbiculata *Col. in Trans. N.Z. Inst.* xxii (1890) 459.

North Island: South-eastern base of Ruapehu, *T. Kirk!* Var. *orbiculata:* Rangipo Desert, *H. Hill! T. Kirk! Petrie!* South Island: Broken River, *J. D. Enys! T. Kirk!* Ashburton Mountains, *Potts;* Maniototo Plain, *Petrie!* Var. *orbiculata:* Mount Ida, *Petrie!* 1500–4500 ft. December–January.

A most distinct and remarkable species, apparently rare and local. The pod dehisces by one of the valves separating from the replum down one side, but remaining attached at the tip and other side.

2. **C. uniflora** *T. Kirk in Gard. Chron.* i (1884) 512.—A much-dwarfed slender matted plant, forming large patches; stems often subterranean, putting out slender branches 1–2 in. high. Branchlets very narrow, $\frac{1}{30}$–$\frac{1}{20}$ in., thin, compressed, glabrous, sometimes almost herbaceous. Leaves not seen. Flowers solitary, $\frac{1}{3}$ in. long, purplish-red; peduncles very long and slender, almost capillary, glabrous or puberulous, bracteolate about the middle. Calyx campanulate, glabrous or silky; teeth short, broad, acute. Standard broad, with a short broad claw; wings shorter than the keel. Pod $\frac{1}{3}$–$\frac{1}{2}$ in. long, linear-oblong; valves slightly wrinkled; beak straight or oblique. Seeds 2–6.—*T. Kirk in Trans. N.Z. Inst.* xvi (1884) 379; *Buch. l.c.* 394; *T. Kirk Students' Fl.* (1899) 109; *Cheesem. Man. N.Z. Fl.* (1906) 111. C. Suteri *Col. in Trans. N.Z. Inst.* xxiii (1891) 383.

South Island: Canterbury—Lake Grassmere, Lochnavar, Poulter River, *J. D. Enys!* Otira River, *Cockayne!* Cass River, *Cockayne!* Mount Cook district, *Suter! T. F. C.* Otago—Waitaki Valley, *Buchanan!* Lake Hawea, *Petrie!* 1000–3000 ft. December–January. Probably not uncommon, but easily overlooked.

3. **C. nana** *Col. ex Hook. f. Handb. N.Z. Fl.* (1864) 49.—A dwarf rigid glabrous plant, forming broad matted patches. Branchlets 2–4 in. long, $\frac{1}{6}$–$\frac{1}{2}$ in. broad, thin, much flattened, strict, erect, minutely grooved or striate. Leaves not seen. Racemes 2–4-flowered; pedicels long, very slender, glabrous or with a few silky hairs. Flowers $\frac{1}{3}$–$\frac{1}{2}$ in. long, purplish-red. Calyx campanulate, usually silky; teeth short, broadly triangular, subacute. Standard broad, with a short broad claw; wings shorter than the keel. Pods $\frac{1}{3}$–$\frac{1}{2}$ in. long, linear-oblong, often narrowed towards the base; beak short, straight. Seeds 2–6.—*T. Kirk Students' Fl.* (1899) 109; *Cheesem. Man. N.Z. Fl.* (1906) 111. C. australis *var.* nana *Benth. in Hook. f. Fl. Nov. Zel.* i (1853) 50.

North Island: Elevated open country between Lake Taupo, Ngauruhoe, and Ruapehu. South Island: Nelson to Central Otago, abundant in stony river-valleys. Altitudinal range from almost sea-level to 2800 ft. December–January.

One of the most widely spread species of the genus. Its nearest ally is *C. uniflora*, from which it is separated by the broader and more obtuse branchlets and racemed flowers.

4. **C. Monroi** *Hook. f. Handb. N.Z. Fl.* (1864) 49.—A small excessively branched rigid and woody plant, forming flat compact masses 6–24 in. diam. or even more, and 2–6 in. high. Branches crowded, very stout, flattened with rounded edges, grooved or striate, glabrous or slightly silky, $\frac{1}{8}$–$\frac{1}{5}$ in. broad. Leaves only seen on young plants, cuneate or obcordate, emarginate, silky. Racemes 2–5-flowered, sometimes fascicled and forming a lax corymb; pedicels slender. Flowers $\frac{1}{3}$ in. long, reddish-purple. Calyx silky, sometimes densely so; teeth broad- or narrow-triangular. Standard longer than the keel, broad, emarginate; wings shorter than the keel. Pods $\frac{1}{3}$–$\frac{2}{3}$ in. long, unusually turgid, straight or curved; valves conspicuously wrinkled and corrugated when mature; beak short, usually oblique, sometimes straight. Seeds 4–14, brownish or reddish-brown mottled with darker.—*T. Kirk Students' Fl.* (1899) 109; *Cheesem. Man. N.Z. Fl.* (1906) 112. C. corrugata *Col. in Trans. N.Z. Inst.* xv (1883) 320.

South Island: Dry gravelly places on the mountains, Marlborough to Otago, not uncommon. Altitudinal range from 250 ft. to fully 4000 ft. December–February.

Easily distinguished by the depressed habit, short stout woody branchlets, lax racemes, and large remarkably turgid many-seeded pod. Dr. Cockayne, in an interesting note printed in Trans. N.Z. Inst. l (1918) 167, shows that at present several apparently distinct varieties are included within the circumscription of the species, which has hitherto always been regarded as exceptionally stable in its characters.

5. **C. Williamsii** *T. Kirk in Trans. N.Z. Inst.* xii (1880) 394.—An erect much-branched shrub 6–12 ft. high, according to its discoverer sometimes reaching 18 ft., with a trunk 4 in. diam. Branchlets $\frac{1}{3}$–$\frac{1}{2}$ in. broad, thin, much compressed, finely and closely striate or grooved, glabrous or slightly pubescent when young; notches distant, alternate. Leaves seldom produced except on young plants, 1–3-foliolate; leaflets obovate or obcordate. Flowers large, $\frac{3}{4}$–1 in. long, stated to be yellowish-red by its discoverer, but a cultivated specimen that flowered in Wellington had a ground colour of pale-yellow adorned with purple lines and a few purple blotches, solitary or in 2–6-flowered fascicles or racemes, more or less pendulous; pedicels short, slender, silky. Calyx large, narrow-campanulate, silky-pubescent; teeth linear-subulate, acute. Standard rather larger than the keel, sharply recurved $\frac{1}{3}$ of the way from the base; wings narrow-oblong, falcate, shorter than the keel. Pod 1–$1\frac{1}{4}$ in. long, on stout erect pedicels, oblong, turgid; beak long, straight or oblique. Seeds 9–12, red mottled with black.—*Students' Fl.* (1899) 110; *Cheesem. Man. N.Z. Fl.* (1906) 112; *Ill. N.Z. Fl.* i (1914) t. 32.

North Island: East Cape district, from Te Kaha and Raukokere in an easterly direction to Hicks Bay, but barely reaching the East Cape, *Bishop Williams! Petrie! Adams! Sherwood!* November–December.

A very distinct species. The broad thin branchlets, large flowers, and large turgid pod separate it from all others.

6. **C. australis** *R. Br. in Bot. Reg.* xi (1825) t. 912.—An erect much-branched glabrous usually leafless shrub 3–12 ft. high. Branchlets straight, often much elongated, $\frac{1}{10}$–$\frac{1}{3}$ in. broad, thin and flat, finely and closely striate; notches alternate, close or rather distant. Leaves seldom seen except on young plants, $\frac{3}{4}$–2 in. long, 1-foliolate or 3–5-foliolate; leaflets obcordate or obovate-cuneate, membranous, sessile. Racemes variable in length, 3–12-flowered, solitary or fascicled; pedicels puberulous or glabrous. Flowers crowded, small, $\frac{1}{8}$–$\frac{1}{6}$ in. long, pale-purplish. Calyx campanulate, teeth minute. Standard much broader than long, retuse, claw very short; keel equal in length or slightly shorter; wings oblong, almost as long as the keel. Pod oblong, compressed, $\frac{1}{3}$–$\frac{1}{2}$ in. long, suddenly narrowed into a short acute beak; valves slightly convex; replum stout, persistent long after the valves have fallen. Seeds 1–4, red, usually spotted with black.—*A. Cunn. Precur.* (1839) n. 574; *Hook. f. Fl. Nov. Zel.* i (1853) 50; *Handb. N.Z. Fl.* (1864) 50; *T. Kirk Students' Fl.* (1899) 110; *Cheesem. Man. N.Z. Fl.* (1906) 113. C. Cunninghamii *Raoul Choix* (1846) t. 28B. Boissiaea scolopendrina *A. Rich. Fl. Nouv. Zel.* (1832) 346.

Var. **strictissima** *T. Kirk Students' Fl.* (1899) 110.—Branchlets $\frac{1}{4}$–$\frac{3}{8}$ in. broad. Racemes strict, many-flowered, dense. Pedicels very short. Pods not seen.

North Island: Abundant from the North Cape to Wanganui and Hawke's Bay. South Island: Queen Charlotte Sound, *J. Rutland!* Var. *strictissima:* White Cliffs, Taranaki, *T. F. C.* Sea-level to 2800 ft. *Makaka.* November–December.

7. **C. Petriei** *T. Kirk Students' Fl.* (1899) 111.—A stout sparingly branched shrub 1–6 ft. high, with rigid terete or subterete branches. Branchlets stout, $\frac{1}{12}$–$\frac{1}{8}$ in. diam., compressed at the tips, plano-convex or terete below, grooved or striate. Leaves not seen. Racemes laxly 3–8-flowered, solitary or many together, often forming dense fascicles; pedicels slender, and with the rhachis silky-pubescent or almost villous. Flowers rather small, $\frac{1}{6}$ in. long. Calyx campanulate, silky; teeth short, broad, acute. Standard broader than long, exceeding the keel and wings. Ovary occasionally pubescent. Pods $\frac{1}{4}$–$\frac{1}{3}$ in. long, broadly oblong, turgid, oblique at the tip; valves thick, reticulated; beak short, stout. Seeds 1–4, usually 2–3.—*Cheesem. Man. N.Z. Fl.* (1906) 113. C. violacea *T. Kirk Students' Fl.* (1899) 112.

Var. **robusta** *Cheesem.*—Pods longer, $\frac{1}{3}$–$\frac{1}{2}$ in., elliptic-oblong. Seeds 3–6. Other characters much as in the type.—C. robusta *T. Kirk l.c.*

South Island: Mount Cook district, *T. F. C.;* Central Otago, not uncommon, *Petrie!* Var. *robusta:* Nelson—Wairau Valley, *T. F. C.* Canterbury—Broken River basin, *J. D. Enys! T. Kirk! Petrie! T. F. C.;* Kowai River, *Petrie!*

The distinguishing characters of this species lie in its stout rigid habit, almost terete branchlets, numerous often fascicled racemes of rather small flowers, and the turgid pod. Mr. Kirk's *C. robusta* cannot be separated except by the longer and proportionately narrower pod with a larger number of seeds, and is best kept as a variety.

8. **C. subulata** *T. Kirk Students' Fl.* (1899) 112.—A slender erect often leafy glabrous shrub 3–6 ft. high, with almost terete branches. Branchlets $\frac{1}{20}$–$\frac{1}{10}$ in. broad, compressed or plano-convex, strict and rigid, grooved or striated. Leaves 3-foliolate; leaflets oblong-obovate, retuse. Racemes laxly 3–6-flowered, one or several together; pedicels silky or almost glabrous, shorter than the flowers. Calyx campanulate; teeth minute,

acute. Standard broader than long, about equal in length to the wings and keel. Pod $\frac{1}{4}$–$\frac{3}{8}$ in. long, turgid, subulate, acuminate; beak short, stout, straight. Seeds 1–4, usually 2.—*Cheesem. Man. N.Z. Fl.* (1906) 114.

North Island: Kaimanawa Mountains, *B. C. Aston.* South Island: Apparently abundant on the eastern side of the Island, from Queen Charlotte Sound to Foveaux
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9. **C. virgata** *T. Kirk Students' Fl.* (1899) 112.—An erect rigid glabrous shrub 3–4 ft. high, branched from the base. Branchlets numerous, terete or plano-convex, grooved. Leaves not seen. Racemes few, 3–5-flowered, lax; pedicels and rhachis glabrous or puberulous. Calyx campanulate, glabrous; teeth short, acute. Standard broader than long, equalling the wings and exceeding the keel. Pods (not quite ripe) $\frac{1}{3}$ in. long, oblong, turgid, narrowed below; beak short, straight, subulate. Seeds 1–3.—*Cheesem. Man. N.Z. Fl.* (1906) 114.

South Island: Otago—*Petrie.* Southland—At Makarewa and Orepuki, *T. Kirk!*

I am only acquainted with this plant through a few imperfect specimens in Mr. Kirk's herbarium, and have therefore reproduced in its main features the description given in the "Students' Flora." Mr. Kirk remarks that it is "distinguished by the paucity of its racemes, small whitish flowers, and oblong pod narrowed at both ends." I fear that it is much too closely allied to *C. subulata.*

10. **C. diffusa** *Petrie in Trans. N.Z. Inst.* xxv (1893) 272.—A small erect or spreading glabrous much-branched shrub 1–2 ft. high. Branchlets slender, $\frac{1}{20}$–$\frac{1}{15}$ in. wide, compressed or plano-convex or almost terete, striate. Leaves not seen. Racemes numerous, short, 3–6-flowered; pedicels shorter than the flowers. Calyx cup-shaped, mouth ciliolate; teeth minute, sometimes hardly evident. Pods very small, $\frac{1}{6}$–$\frac{1}{5}$ in. long, obliquely oblong, slightly narrowed at the base; valves slightly convex; beak short, stout, subulate.—*Cheesem. Man. N.Z. Fl.* (1906) 114.

South Island: Canterbury—Near Lincoln, *T. Kirk!* Otago—*Buchanan!* Otepopo River, *Petrie!*

I have seen few specimens, and those by no means good, of this curious little species. It appears to have the habit of *C. flagelliformis* var. *corymbosa,* differing only in the smaller size and smaller pod, and will probably prove to be a form of that plant. Mr. Kirk's specimens from Dry River, Wellington, quoted in the "Students' Flora," are certainly referable to *C. flagelliformis.*

11. **C. gracilis** *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 336.—A slender shrub 3–6 ft. high; stems weak, flexuous, terete, sparingly branched, often interlaced or scrambling over other bushes, more or less leafy, especially when growing in sheltered places. Branchlets almost filiform, grooved, silky or pilose. Leaves $\frac{1}{2}$–1 in. long, pinnately 3–5-foliolate; petioles silky; leaflets $\frac{1}{6}$–$\frac{1}{3}$ in., broadly obcordate, glabrous. Racemes loosely 2–6-flowered; pedicels slender, silky. Flowers rather

6. **C. australis** *R. Br. in Bot. Reg.* xi (1825) t. 912.—An erect much-branched glabrous usually leafless shrub 3–12 ft. high. Branchlets straight, often much elongated, $\frac{1}{10}$–$\frac{1}{3}$ in. broad, thin and flat, finely and closely striate; notches alternate, close or rather distant. Leaves seldom seen except on young plants, $\frac{3}{4}$–2 in. long, 1-foliolate or 3–5-foliolate; leaflets obcor
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see T.N.Z.I. Vol. 56 p.21.

N.Z. Fl. (1864) 50; *T. Kirk Students' Fl.* (1899) 110; *Cheesem. Man. N.Z. Fl.* (1906) 113. C. Cunninghamii *Raoul Choix* (1846) t. 28B. Boissiaea scolopendrina *A. Rich. Fl. Nouv. Zel.* (1832) 346.

Var. **strictissima** *T. Kirk Students' Fl.* (1899) 110.—Branchlets $\frac{1}{4}$–$\frac{3}{8}$ in. broad. Racemes strict, many-flowered, dense. Pedicels very short. Pods not seen.

North Island: Abundant from the North Cape to Wanganui and Hawke's Bay. South Island: Queen Charlotte Sound, *J. Rutland!* Var. *strictissima:* White Cliffs, Taranaki, *T. F. C.* Sea-level to 2800 ft. *Makaka.* November–December.

7. **C. Petriei** *T. Kirk Students' Fl.* (1899) 111.—A stout sparingly branched shrub 1–6 ft. high, with rigid terete or subterete branches. Branchlets stout, $\frac{1}{12}$–$\frac{1}{8}$ in. diam., compressed at the tips, plano-convex or terete below, grooved or striate. Leaves not seen. Racemes laxly 3-8-flowered, solitary or many together, often forming dense fascicles; pedicels slender, and with the rhachis silky-pubescent or almost villous. Flowers rather small, $\frac{1}{6}$ in. long. Calyx campanulate, silky; teeth short, broad, acute. Standard broader than long, exceeding the keel and wings. Ovary occasionally pubescent. Pods $\frac{1}{4}$–$\frac{1}{3}$ in. long, broadly oblong, turgid, oblique at the tip; valves thick, reticulated; beak short, stout. Seeds 1–4, usually 2–3.—*Cheesem. Man. N.Z. Fl.* (1906) 113. C. violacea *T. Kirk Students' Fl.* (1899) 112.

Var. **robusta** *Cheesem.*—Pods longer, $\frac{1}{2}$–$\frac{1}{2}$ in., elliptic-oblong. Seeds 3–6. Other characters much as in the type.—C. robusta *T. Kirk l.c.*

South Island: Mount Cook district, *T. F. C.;* Central Otago, not uncommon, *Petrie!* Var. *robusta:* Nelson—Wairau Valley, *T. F. C.* Canterbury—Broken River basin, *J. D. Enys! T. Kirk! Petrie! T. F. C.;* Kowai River, *Petrie!*

The distinguishing characters of this species lie in its stout rigid habit, almost terete branchlets, numerous often fascicled racemes of rather small flowers, and the turgid pod. Mr. Kirk's *C. robusta* cannot be separated except by the longer and proportionately narrower pod with a larger number of seeds, and is best kept as a variety.

8. **C. subulata** *T. Kirk Students' Fl.* (1899) 112.—A slender erect often leafy glabrous shrub 3–6 ft. high, with almost terete branches. Branchlets $\frac{1}{20}$–$\frac{1}{10}$ in. broad, compressed or plano-convex, strict and rigid, grooved or striated. Leaves 3-foliolate; leaflets oblong-obovate, retuse. Racemes laxly 3–6-flowered, one or several together; pedicels silky or almost glabrous, shorter than the flowers. Calyx campanulate; teeth minute,

acute. Standard broader than long, about equal in length to the wings and keel. Pod $\frac{1}{4}$–$\frac{3}{8}$ in. long, turgid, subulate, acuminate; beak short, stout, straight. Seeds 1–4, usually 2.—*Cheesem. Man. N.Z. Fl.* (1906) 114.

NORTH ISLAND: Kaimanawa Mountains, *B. C. Aston.* SOUTH ISLAND: Apparently abundant on the eastern side of the Island, from Queen Charlotte Sound to Foveaux Strait. Marlborough—Endeavour Inlet, *J. H. Macmahon!* Whakamarina, Blenheim, *T. Kirk!* Lake Tennyson and the Clarence Valley, *T. F. C., R. M. Laing.* Canterbury—Not uncommon on the plains, *T. Kirk! Petrie!* Banks Peninsula, *R. M. Laing;* Broken River, *J. D. Enys* and *T. Kirk, T. F. C.;* Cass River, *Cockayne* and *Foweraker;* Mount Peel, *H. H. Allan.* Otago and Southland—*Buchanan! Petrie! T. Kirk, Crosby Smith.* Sea-level to 3000 ft. November–January.

This appears to be characterized by the strict and slender sometimes almost filiform branchlets, small flowers, and turgid subulate pods. Herbarium specimens in flower alone are easily confounded with *C. flagelliformis*, but the pods are altogether different.

9. **C. virgata** *T. Kirk Students' Fl.* (1899) 112.—An erect rigid glabrous shrub 3–4 ft. high, branched from the base. Branchlets numerous, terete or plano-convex, grooved. Leaves not seen. Racemes few, 3–5-flowered, lax; pedicels and rhachis glabrous or puberulous. Calyx campanulate, glabrous; teeth short, acute. Standard broader than long, equalling the wings and exceeding the keel. Pods (not quite ripe) $\frac{1}{3}$ in. long, oblong, turgid, narrowed below; beak short, straight, subulate. Seeds 1–3.—*Cheesem. Man. N.Z. Fl.* (1906) 114.

SOUTH ISLAND: Otago—*Petrie.* Southland—At Makarewa and Orepuki, *T. Kirk!*

I am only acquainted with this plant through a few imperfect specimens in Mr. Kirk's herbarium, and have therefore reproduced in its main features the description given in the "Students' Flora." Mr. Kirk remarks that it is "distinguished by the paucity of its racemes, small whitish flowers, and oblong pod narrowed at both ends." I fear that it is much too closely allied to *C. subulata.*

10. **C. diffusa** *Petrie in Trans. N.Z. Inst.* xxv (1893) 272.—A small erect or spreading glabrous much-branched shrub 1–2 ft. high. Branchlets slender, $\frac{1}{20}$–$\frac{1}{15}$ in. wide, compressed or plano-convex or almost terete, striate. Leaves not seen. Racemes numerous, short, 3–6-flowered; pedicels shorter than the flowers. Calyx cup-shaped, mouth ciliolate; teeth minute, sometimes hardly evident. Pods very small, $\frac{1}{6}$–$\frac{1}{5}$ in. long, obliquely oblong, slightly narrowed at the base; valves slightly convex; beak short, stout, subulate.—*Cheesem. Man. N.Z. Fl.* (1906) 114.

SOUTH ISLAND: Canterbury—Near Lincoln, *T. Kirk!* Otago—*Buchanan!* Otepopo River, *Petrie!*

I have seen few specimens, and those by no means good, of this curious little species. It appears to have the habit of *C. flagelliformis* var. *corymbosa*, differing only in the smaller size and smaller pod, and will probably prove to be a form of that plant. Mr. Kirk's specimens from Dry River, Wellington, quoted in the "Students' Flora," are certainly referable to *C. flagelliformis.*

11. **C. gracilis** *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 336.—A slender shrub 3–6 ft. high; stems weak, flexuous, terete, sparingly branched, often interlaced or scrambling over other bushes, more or less leafy, especially when growing in sheltered places. Branchlets almost filiform, grooved, silky or pilose. Leaves $\frac{1}{2}$–1 in. long, pinnately 3–5-foliolate; petioles silky; leaflets $\frac{1}{6}$–$\frac{1}{3}$ in., broadly obcordate, glabrous. Racemes loosely 2–6-flowered; pedicels slender, silky. Flowers rather

large, $\frac{1}{3}$–$\frac{1}{2}$ in. Calyx campanulate; teeth long and narrow, acute, silky within. Standard broad, 2-lobed, slightly longer than the keel. Pods $\frac{1}{2}$ in. long, elliptic, turgid; replum thick; beak very long, straight, stout, subulate. Seeds 2.—*Cheesem. Man. N.Z. Fl.* (1906) 117; *Ill. N.Z. Fl.* i (1914) t. 35. C. Kirkii *Hook. f. in Ic. Plant.* (1881) 1332; *T. Kirk Students' Fl.* (1899) 113.

South Island: Canterbury—Vicinity of Christchurch, *J. B. Armstrong! Haast! Cockayne!* Otago—Cardrona Valley, *T. Kirk!* Otepopo River, Sowburn, *Petrie!* Sea-level to 1500 ft. November–December.

A distinct species, at once recognized by the weak terete stems, large flowers, and large turgid pod with a long almost pungent beak.

12. **C. grandiflora** *Hook. f. Handb. N.Z. Fl.* (1864) 49.—An erect or spreading much-branched glabrous or slightly pubescent shrub 2–6 ft. high, usually leafy save in exposed situations. Branchlets usually spreading, rarely fastigiate, $\frac{1}{12}$–$\frac{1}{8}$ in. broad, more or less compressed, deeply grooved or striate. Leaves numerous, pinnately 3–5-foliolate, obcordate-cuneate, silky-pubescent when young, glabrous when old. Racemes $\frac{1}{3}$–1 in. long, pedunculate, laxly 5–12-flowered. Flowers usually purplish veined with violet, $\frac{1}{4}$ in. long. Standard broader than long, exceeding the keel; wings as long as the keel. Pods oblong, $\frac{1}{4}$–$\frac{1}{2}$ in. long, narrowed into a rather long subulate beak; valves convex.—*T. Kirk Students' Fl.* (1899) 110; *Cheesem. Man. N.Z. Fl.* (1906) 115; *Ill. N.Z. Fl.* i (1914) t. 33. C. australis *var.* grandiflora *Benth. in Hook. f. Fl. Nov. Zel.* i (1853) 50.

Var. **divaricata** *T. Kirk Students' Fl. l.c.*—Branches divaricating at right angles, flexuous, compressed at the tips, subterete below. Racemes slender, 5–15-flowered; flowers rather smaller. Pod elliptic-oblong, narrowed at both ends; beak short.

Var. **alba** *T. Kirk Students' Fl. l.c.*—Branches spreading. Racemes numerous, 4–8-flowered. Flowers either pure-white or with a purple blotch in the middle of the standard.

South Island: Mountain districts from Nelson to the south of Otago; most abundant on the western side. Ascends to 3000 ft.; descends to sea-level in the West Coast Sounds. Var. *divaricata:* Upper Waimakariri district, at Mount White and the Poulter River, *J. D. Enys!* near Greymouth, *R. Helms!* Fox's River, *W. Townson!* Var. *alba:* Sources of the Waimakariri, *T. Kirk! J. D. Enys! Cockayne! T. F. C.*, and others; Mount Cook district, *T. F. C.;* Lake Harris, *H. J. Matthews!*

A very variable plant, which requires much more study before its many varieties can be understood. Its chief characteristics are the leafy habit, deeply grooved branchlets, lax many-flowered racemes, comparatively large flowers, and small pod with slightly convex valves and rather long beak. It attains its greatest luxuriance in the moist river-valleys of Westland.

The variety *alba*, originally discovered near the source of the Waimakariri River by Enys, is remarkable for its deliciously fragrant flowers. In the original locality the flowers usually have a large purple spot on the standard; but in the Tasman Valley (Mount Cook) that form can be found together with another in which the flowers are pure-white. So also with specimens gathered at Lake Harris by the late Mr. H. J. Matthews.

13. **C. odorata** *Col. ex Hook. f. Fl. Nov. Zel.* i (1853) 50.—A much-branched shrub 3–10 ft. high, leafy in spring and early summer. Branchlets $\frac{1}{20}$–$\frac{1}{8}$ in. broad, distichous, slender, pendulous, compressed or plano-convex, grooved, pubescent towards the tips. Leaves very numerous, small, $\frac{1}{4}$–$\frac{3}{4}$ in. long, silky-pubescent, pinnately 3–7-foliolate; leaflets oblong-obcuneate or narrow-obovate, notched at the apex. Racemes slender, strict, erect (apparently drooping in herbarium specimens on account of

the branches being pendulous), 10–20-flowered, pubescent, especially when young. Flowers small, $\frac{1}{8}$–$\frac{1}{6}$ in. long. Calyx-teeth short, acute, ciliolate. Standard broader than long, about equalling the wings and keel. Ovary glabrous. Pod $\frac{1}{6}$–$\frac{1}{4}$ in. long, obliquely ovate, abruptly narrowed into a long stout subulate beak; valves flat or very slightly convex. Seeds 2, rarely more.—*Hook. f. Handb. N.Z. Fl.* (1864) 50; *T. Kirk Students' Fl.* (1899) 113; *Cheesem. Man. N.Z. Fl.* (1906) 115; *Ill. N.Z. Fl.* i (1914) t. 34.

Var. **pilosa** *T. Kirk l.c.*—Habit and flowers of *C. odorata*, but ovary silky, and pod hairy until nearly mature.—C. pilosa *Col. ex Hook. f. Fl. Nov. Zel.* i (1853) 50; *Handb. N.Z. Fl.* (1864) 49. East coast of the North Island, *Colenso.*

North Island: Ruahine Mountains to Cook Strait, not uncommon in the interior. South Island: Pelorus Sound, *T. Kirk!* Nelson—*Monro, W. T. L. Travers.* Ascends to 2500 ft. November-January.

C. odorata is separated from *C. grandiflora*, to which it is closely allied, by the drooping slender pubescent branchlets, smaller flowers, and shorter flatter and broader pod with a longer beak. *C. pilosa* has not been gathered since its original discovery by Mr. Colenso somewhere on the east coast of the North Island, prior to 1850. Judging from the description, it does not differ from *C. odorata* except in the pubescent ovary. This is a character that has been occasionally noted in several of the species, but which does not seem in itself to be sufficient for specific distinction.

14. **C. angustata** *T. Kirk Students' Fl.* (1899) 114.—A small erect glabrous shrub 1–3 ft. high, rarely more; usually leafy in spring and summer. Branches spreading, terete, deeply grooved; branchlets very slender, $\frac{1}{20}$–$\frac{1}{12}$ in. broad, sometimes almost filiform, subcompressed at the tips. Leaves very variable in size, in young plants sometimes $\frac{3}{4}$–$1\frac{1}{2}$ in. long, pinnately 3–5-foliolate; leaflets obcordate-cuneate, glaucous beneath; of old plants much smaller. Flowers only seen in an imperfect state, minute, $\frac{1}{10}$–$\frac{1}{8}$ in. long. Calyx cup-shaped; teeth short and broad, ciliolate. Fruiting-racemes numerous, slender, erect or inclined; pods many, usually from 15 to 25, according to Mr. Kirk sometimes as many as 40; valves flat or slightly convex, gradually narrowed into a short beak. Seeds usually 2.—*Cheesem. Man. N.Z. Fl.* (1906) 116.

South Island: Nelson—Valley of the Buller, near the junction of the Lyell, *T. Kirk!* lower down the valley, nearer Westport, *W. Townson!*

A very peculiar little plant, which differs from all the species known to me in the large number of pods in the fruiting-raceme.

15. **C. flagelliformis** *Col. ex Hook. f. Fl. Nov. Zel.* i (1853) 51.—A much-branched shrub 3–8 ft. high, very variable in habit; branches erect or spreading. Branchlets numerous, very slender, $\frac{1}{20}$–$\frac{1}{10}$ in. broad, erect and fastigiate or spreading, sometimes drooping, compressed or plano-convex, grooved. Leaves of young plants 1–$1\frac{1}{2}$ in. long, pinnately 3–5-foliolate; leaflets oblong-cuneate, notched at the tip; of mature plants smaller, usually 3-foliolate. Racemes 1 or 2–3 together, laxly 3–7-flowered, often reduced to fascicles; pedicels usually pubescent. Flowers minute, $\frac{1}{10}$–$\frac{1}{8}$ in. long. Calyx campanulate; teeth small, acute, ciliolate. Standard very broad, retuse, about equalling the wings and longer than the keel. Pods solitary or several together, $\frac{1}{4}$–$\frac{1}{3}$ in. long, erect, compressed, obliquely oblong or ovate, sometimes nearly orbicular; beak long, stout, subulate. Seeds 1–4, usually 2.—*Hook. f. Handb. N.Z. Fl.* (1864) 50; *T. Kirk Students' Fl.* (1899) 116; *Cheesem. Man. N.Z. Fl.* (1906) 116. C. australis *Raoul Choix* (1846) t. 28A (*not of R. Br.*). C. multicaulis *Col. in Trans. N.Z. Inst.* xxv (1893) 329. C. micrantha *Col. l.c.* xxvi (1894) 313. Lotus arboreus *Forst. f. Prodr.* (1786) n. 258.

Var. **corymbosa** *T. Kirk Students' Fl.* (1899) 114.—Branchlets slender, often flaccid and drooping, striate. Pod shorter, broadly oblong, much compressed, oblique; valves thin. Seed usually 1.—C. corymbosa *Col. in Trans. N.Z. Inst.* xxi (1889) 80.

Var. **Hookeri** *Cheesem.*—Smaller, 2–4 ft. Racemes very numerous, densely fascicled. Flowers larger, $\frac{1}{6}$ in. Pod ovate-oblong, less compressed; beak shorter.—C. Hookeri *T. Kirk l.c.* 115.

Var. **acuminata** *Cheesem.*—Pods $\frac{1}{4}$–$\frac{3}{8}$ in., broadest at the base, almost obpyriform, somewhat falcate, acuminate; beak oblique. Otherwise as in the type, but flowers not known.—C. acuminata *T. Kirk l.c.*

North and South Islands: Not uncommon from the Upper Thames and Waikato southwards. Var. *corymbosa:* Hawke's Bay, *Colenso!* Var. *Hookeri:* South of Wellington Province, *T. Kirk!* Var. *acuminata:* Palliser Bay, *T. Kirk!* Sea-level to 3000 ft. November–January.

As a species *C. flagelliformis* is best distinguished by the slender grooved branchlets, minute flowers, which are either in open racemes or fascicled, and in the short broad pod, which is much compressed, and ends in a stout subulate beak sometimes $\frac{1}{10}$ in. long. In dry places it is usually leafless when adult, but frequently produces leaves in moist situations, or where shaded. Mr. Kirk's *C. Hookeri* appears to me to differ in no essential character; and his *C. acuminata* is founded on a single fruiting specimen, which altogether agrees with *C. flagelliformis* except for a slight difference in the shape of the pod.

The above arrangement is the same as that adopted in the first edition of this work. In all probability it includes several plants that will ultimately prove their claims to be treated as distinct species or varieties. But, personally, I have been unable to make the large number of field observations required to provide a firm foundation for future work, or to collect the suites of specimens necessary for purposes of comparison. It is hoped that other workers will soon undertake the task.

16. **C. paludosa** *Cockayne in Trans. N.Z. Inst.* xlvii (1915) 113.—A much and fastigiately branched erect shrub 3–8 ft. high; branchlets yellow-green, strict, very slender, almost filiform, conspicuously striate, leafless when mature. Flowers in 2–6-flowered racemes or fascicles, minute, $\frac{1}{10}$ in. long. Calyx campanulate, sparingly pilose, dentate; the teeth very shortly ciliate. Pod elliptic-oblong, $\frac{1}{3}$ in. long, much compressed; beak more than $\frac{1}{2}$ as long as the valves, straight, subulate. Seeds 2–4, red spotted with black.

South Island: Westland, abundant in lowland swamps, *Cockayne!*

A puzzling plant, which possibly would be more appropriately treated as a variety of *C. flagelliformis.* Dr. Cockayne draws attention to its relationship to *C. corymbosa* Col., which, in agreement with Kirk, I have reduced to *C. flagelliformis.* But a comparison between *C. paludosa* and some of Colenso's type specimens of *C. corymbosa,* given to me by Mr. Colenso himself many years ago, shows that *C. corymbosa* has a shorter broader pod, with a shorter beak, and the seeds are seldom more than 2. In addition to the above, the habit of *C. paludosa* is much more fastigiate than *C. corymbosa.* For the present I therefore hesitate to place the two plants in closer juxtaposition than at present. A nearer approach to *C. paludosa* is probably made by a plant collected by Mr. Townson in the Buller Valley and at Karamea.

17. **C. Fieldii** *Cockayne in Trans. N.Z. Inst.* l (1918) 163.—A small glabrous sparingly branched prostrate shrub; leafless except when young. Branches as much as 15 in. long, but often much less; $\frac{1}{10}$–$\frac{1}{8}$ in. diam., thin, compressed, arcuate, sparingly branched; bark yellowish-green. Racemes short, 2–5-flowered; pedicels $\frac{1}{8}$ in. long. Flowers not seen. Pods small, $\frac{1}{10}$–$\frac{1}{8}$ in. long, obliquely-ovoid or -oblong, dehiscent, conspicuously turgid, blackish-brown; valves rugose; beak short, stout, triangular. Seeds varying in number from 2–5, but usually 3–4; colour pale-brown.

South Island: On wind-swept sandstone ledges on a small island in West Wanganui Harbour, north-west Nelson, *W. H. Field* and *B. C. Aston!*

My knowledge of this curious species is confined to two rather indifferent specimens [illegible] No doubt there is some affinity between it [illegible] removes it [illegible] ct ts, n. els ıg, s; ng od teeth shallow, acute. the wings; keel-petals much shorter, broad above, [illegible] $\frac{1}{6}$–$\frac{1}{5}$ in. long, indehiscent, obovoid, turgid, compressed from back to front so that the width is greater than the depth; valves reticulate; beak short, subulate, oblique or recurved. Seeds 1–2.—*Cheesem. Man. N.Z. Fl.* (1906) 117. Huttonella compacta *T. Kirk Students' Fl.* (1899) 115.

South Island: Otago—Clutha Valley, between Lake Wakatipu and Clyde, *Petrie!* November–December.

This can be distinguished from the other species of the section *Huttonella* by the crowded terete branchlets, long and lax racemes of rather large flowers, and the larger pod.

19. **C. curta** *Petrie in Trans. N.Z. Inst.* xxv (1893) 271.—An erect sparingly branched glabrous shrub 1–2 ft. high. Branchlets $\frac{1}{20}$–$\frac{1}{15}$ in. broad, slender, terete or nearly so, subcompressed at the tips, grooved or striate. Leaves not seen. Racemes variable in length, distant, 6–10-flowered; rhachis elongating after flowering; pedicels short, silky. Flowers $\frac{1}{6}$ in. long. Calyx more or less pubescent, campanulate; teeth short, acute. Standard broader than long, retuse, exceeding the wings; keel with a short claw. Ovary silky. Pod $\frac{1}{6}$–$\frac{1}{5}$ in. long, pendulous, turgid, oblong-obovoid, glabrous when mature; valves thin; beak slender, curved upwards. Seeds 2–3.—*Cheesem. Man. N.Z. Fl.* (1906) 118. Huttonella curta *T. Kirk Students' Fl.* (1899) 116.

South Island: Otago—Waitaki Valley, at Duntroon and Kurow, *Petrie!*

Allied to *C. juncea*, but separated by the longer distant racemes, larger flowers, and larger pod. In none of the flowers which I have examined could I find the callosity on the wings mentioned by Mr. Kirk.

20. **C. juncea** *Col. ex Hook. f. Fl. Nov. Zel.* i (1853) 51.—An erect or rarely prostrate glabrous branching shrub 1–2 ft. high. Branchlets very slender, $\frac{1}{25}$–$\frac{1}{15}$ in. broad, compressed or almost terete, grooved. Leaves not seen. Racemes short, often fascicled, 2–8-flowered; pedicels pubescent, rather longer than the calyx. Flowers minute, $\frac{1}{10}$–$\frac{1}{8}$ in. long. Calyx campanulate, silky; teeth very small, acute. Standard broader than long, slightly exceeding the keel; wings narrow, somewhat shorter. Pod usually indehiscent, very small, $\frac{1}{12}$–$\frac{1}{10}$ in. long, oblong or ovoid-oblong, turgid or almost inflated; valves thin and membranous; beak slender, curved or sharply bent. Seeds 1–2, rarely 3.—*Handb. N.Z. Fl.* (1864) 50; *Cheesem. Man. N.Z. Fl.* (1906) 118. Huttonella juncea *T. Kirk Students' Fl.* (1899) 116.

Var. **corymbosa** *T. Kirk Students' Fl.* (1899) 114.—Branchlets slender, often flaccid and drooping, striate. Pod shorter, broadly oblong, much compressed, oblique; valves thin. Seed usually 1.—*C. corymbosa Col. in Trans. N.Z. Inst.* xxi (1889) 80.

Carmichaelia flagelliformis Hk.f. =

C. arborea (Forst) Oliver

see T.N.Z.I. Vol. 56 p.5.

As a species *C. flagelliformis* is best distinguished by the slender grooved branchlets, minute flowers, which are either in open racemes or fascicled, and in the short broad pod, which is much compressed, and ends in a stout subulate beak sometimes $\frac{1}{10}$ in. long. In dry places it is usually leafless when adult, but frequently produces leaves in moist situations, or where shaded. Mr. Kirk's *C. Hookeri* appears to me to differ in no essential character; and his *C. acuminata* is founded on a single fruiting specimen, which altogether agrees with *C. flagelliformis* except for a slight difference in the shape of the pod.

The above arrangement is the same as that adopted in the first edition of this work. In all probability it includes several plants that will ultimately prove their claims to be treated as distinct species or varieties. But, personally, I have been unable to make the large number of field observations required to provide a firm foundation for future work, or to collect the suites of specimens necessary for purposes of comparison. It is hoped that other workers will soon undertake the task.

16. **C. paludosa** *Cockayne in Trans. N.Z. Inst.* xlvii (1915) 113.—A much and fastigiately branched erect shrub 3–8 ft. high; branchlets yellow-green, strict, very slender, almost filiform, conspicuously striate, leafless when mature. Flowers in 2–6-flowered racemes or fascicles, minute, $\frac{1}{10}$ in. long. Calyx campanulate, sparingly pilose, dentate; the teeth very shortly ciliate. Pod elliptic-oblong, $\frac{1}{3}$ in. long, much compressed; beak more than $\frac{1}{2}$ as long as the valves, straight, subulate. Seeds 2–4, red spotted with black.

South Island: Westland, abundant in lowland swamps, *Cockayne!*

A puzzling plant, which possibly would be more appropriately treated as a variety of *C. flagelliformis*. Dr. Cockayne draws attention to its relationship to *C. corymbosa* Col., which, in agreement with Kirk, I have reduced to *C. flagelliformis*. But a comparison between *C. paludosa* and some of Colenso's type specimens of *C. corymbosa*, given to me by Mr. Colenso himself many years ago, shows that *C. corymbosa* has a shorter broader pod, with a shorter beak, and the seeds are seldom more than 2. In addition to the above, the habit of *C. paludosa* is much more fastigiate than *C. corymbosa*. For the present I therefore hesitate to place the two plants in closer juxtaposition than at present. A nearer approach to *C. paludosa* is probably made by a plant collected by Mr. Townson in the Buller Valley and at Karamea.

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SOUTH ISLAND: On wind-swept sandstone ledges on a small island in West Wanganui Harbour, north-west Nelson, *W. H. Field* and *B. C. Aston!*

My knowledge of this curious species is confined to two rather indifferent specimens communicated to me by Dr. Cockayne. No doubt there is some affinity between it and *C. juncea*, as suggested by Cockayne; but the dehiscent pod at once removes it from the section *Huttonella*, to which *C. juncea* belongs.

18. **C. compacta** *Petrie in Trans. N.Z. Inst.* xvii (1885) 272.—An erect much and closely branched shrub 2–4 ft. high. Branchlets numerous, strict, erect, $\frac{1}{15}$–$\frac{1}{10}$ in. diam., terete or nearly so, striate. Leaves not seen. Racemes $\frac{1}{2}$–$\frac{3}{4}$ in. long, numerous, lax, pedunculate, 3–8-flowered; pedicels slender, glabrous, usually longer than the flowers. Flowers $\frac{1}{5}$ in. long, pinkisk-white, fragrant. Calyx somewhat tumid, campanulate, glabrous; teeth shallow, acute. Standard broader than long, 2-lobed, about equalling the wings; keel-petals much shorter, broad above, claws long. Pod $\frac{1}{6}$–$\frac{1}{5}$ in. long, indehiscent, obovoid, turgid, compressed from back to front so that the width is greater than the depth; valves reticulate; beak short, subulate, oblique or recurved. Seeds 1–2.—*Cheesem. Man. N.Z. Fl.* (1906) 117. Huttonella compacta *T. Kirk Students' Fl.* (1899) 115.

SOUTH ISLAND: Otago—Clutha Valley, between Lake Wakatipu and Clyde, *Petrie!* November–December.

This can be distinguished from the other species of the section *Huttonella* by the crowded terete branchlets, long and lax racemes of rather large flowers, and the larger pod.

19. **C. curta** *Petrie in Trans. N.Z. Inst.* xxv (1893) 271.—An erect sparingly branched glabrous shrub 1–2 ft. high. Branchlets $\frac{1}{20}$–$\frac{1}{15}$ in. broad, slender, terete or nearly so, subcompressed at the tips, grooved or striate. Leaves not seen. Racemes variable in length, distant, 6–10-flowered; rhachis elongating after flowering; pedicels short, silky. Flowers $\frac{1}{6}$ in. long. Calyx more or less pubescent, campanulate; teeth short, acute. Standard broader than long, retuse, exceeding the wings; keel with a short claw. Ovary silky. Pod $\frac{1}{6}$–$\frac{1}{5}$ in. long, pendulous, turgid, oblong-obovoid, glabrous when mature; valves thin; beak slender, curved upwards. Seeds 2–3.—*Cheesem. Man. N.Z. Fl.* (1906) 118. Huttonella curta *T. Kirk Students' Fl.* (1899) 116.

SOUTH ISLAND: Otago—Waitaki Valley, at Duntroon and Kurow, *Petrie!*

Allied to *C. juncea*, but separated by the longer distant racemes, larger flowers, and larger pod. In none of the flowers which I have examined could I find the callosity on the wings mentioned by Mr. Kirk.

20. **C. juncea** *Col. ex Hook. f. Fl. Nov. Zel.* i (1853) 51.—An erect or rarely prostrate glabrous branching shrub 1–2 ft. high. Branchlets very slender, $\frac{1}{25}$–$\frac{1}{15}$ in. broad, compressed or almost terete, grooved. Leaves not seen. Racemes short, often fascicled, 2–8-flowered; pedicels pubescent, rather longer than the calyx. Flowers minute, $\frac{1}{10}$–$\frac{1}{8}$ in. long. Calyx campanulate, silky; teeth very small, acute. Standard broader than long, slightly exceeding the keel; wings narrow, somewhat shorter. Pod usually indehiscent, very small, $\frac{1}{12}$–$\frac{1}{10}$ in. long, oblong or ovoid-oblong, turgid or almost inflated; valves thin and membranous; beak slender, curved or sharply bent. Seeds 1–2, rarely 3.—*Handb. N.Z. Fl.* (1864) 50; *Cheesem. Man. N.Z. Fl.* (1906) 118. Huttonella juncea *T. Kirk Students' Fl.* (1899) 116.

North Island: East Cape, *Sinclair;* Rotorua, *T. Kirk;* Taupo and Hawke's Bay, *Colenso!* South Island: Akaroa, *Raoul;* Canterbury Plains, *Haast;* Upper Clarence Valley, *Christensen.* Otago—Waitaki Valley, Maniototo Plains, Lake district, *Petrie!*

Apparently rare and local. The only North Island specimens I have seen are Mr. Colenso's, collected many years ago, and which must be taken as the type of the species. Those from Otago, in Mr. Petrie's herbarium, differ in the stouter and more strict branches and rather longer pods, the beak of which is abruptly bent, forming almost a right angle with the pod. It is possible that two species are confounded under the name of *C. juncea*, as Mr. Kirk has suggested; but more complete sets of specimens are required to settle the matter. Some interesting information respecting this species is given by Dr. Cockayne in Trans. N.Z. Inst. 1 (1918) 165, where he alludes to a variety collected by Mr. Christensen in the Upper Clarence Valley, which is said to differ from both Colenso's type and from Petrie's Otago plant. Not having seen specimens, I leave the matter in abeyance for the present.

21. **C. prona** *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 350.—A small much-branched prostrate shrub; stems and branches closely appressed to the ground, 4–12 in. long, rarely more. Branchlets $\frac{1}{20}$–$\frac{1}{12}$ in. diam., compressed, grooved. Leaves often numerous, 1-foliolate or pinnately 3–5-foliolate, silky; terminal leaflet much larger than the rest, oblong or oblong-obovate, cuneate at the base, deeply retuse at the tip. Racemes small, 3–7-flowered; pedicels short, silky. Flowers minute, $\frac{1}{10}$–$\frac{1}{8}$ in. long. Calyx campanulate; teeth acute. Standard broader than long, retuse; wings shorter than the keel. Pod $\frac{1}{8}$ in. long, broadly oblong, turgid; valves thin; beak short, abruptly turned upwards. Seed solitary.—*Cheesem. Man. N.Z. Fl.* (1906) 119. Huttonella prona *T. Kirk Students' Fl.* (1899) 116.

South Island: Canterbury—Lake Lyndon, lat. 2800 ft., *J. D. Enys! T. Kirk! Cockayne! T. F. C.;* stony beach near the mouth of the Rakaia River, *Cockayne.* Sea-level to 2800 ft. December–January.

3. **CHORDOSPARTIUM** Cheesem.

A leafless shrub or small tree. Branches long, slender, pendulous. Flowers purple, arranged in many-flowered racemes. Bracts and bracteoles small. Calyx-teeth small, subequal or the upper smaller. Standard orbicular, reflexed, contracted into a short claw; wings dolabriform-falcate, free, shorter than the standard; keel incurved, obtuse, about the same length as the standard. Upper stamen free, the rest connate into a sheath; anthers uniform. Ovary silky, sessile, 3–5-ovulate; style incurved, inflexed at the tip, longitudinally barbed within; stigma minute, terminal. Pod short, turgid, rhomboid-ovoid, incurved, indehiscent. Seed solitary or rarely 2, transversely oblong; radicle long, with a double flexure.

A very remarkable plant, in some respects connecting the genera *Corallospartium*, *Carmichaelia*, and *Notospartium*. It agrees with the first in the short turgid subrhomboid 1-seeded pod, and in the grooved branchlets, but differs altogether in habit, in the slender branchlets, and in the markedly different inflorescence. From the section *Huttonella* of *Carmichaelia* it is separated by the same characters. It entirely corresponds with *Notospartium* in habit and inflorescence, and has probably been mistaken for that genus in the absence of fruit, which at once distinguishes the two genera.

Although I consider that the characters of *Chordospartium* fully justify its erection into a separate genus, it must be confessed that the differences between it and *Corallospartium* are not of a very pronounced type. If, however, differences of habit, inflorescence, &c., are not considered sufficient to separate *Corallospartium* and *Chordospartium*, then, by parity of reasoning, similar characters of no greater importance cannot be used to distinguish both these groups from the section *Huttonella* of *Carmichaelia*, and the three genera must merge into one. Some botanists may prefer this course, for it is very much a matter of taste and personal idiosyncrasy whichever view is adopted.

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1. **C. Stevensoni** *Cheesem. in Trans. N.Z. Inst.* xliii (1911) 175.—A leafless shrub or small tree, sometimes attaining a height of 20 ft. or more, with a trunk 6–8 in. in diameter. Branches long, slender, pendulous, terete or subcompressed, grooved; branchlets $\frac{1}{15}$ in. diameter, glabrous, marked with distant nodes, each node with a minute scale. Leaves not seen. Racemes springing from the nodes of the branchlets, single or in fascicles of 2–5, $\frac{3}{4}$–$1\frac{1}{2}$ in. long, very many flowered; rhachis densely woolly; pedicels very short; bracts and bracteoles minute. Flowers $\frac{1}{3}$ in. long, purple, with darker lines on the standard. Calyx densely woolly, cup-shaped, minutely 5-toothed. Standard orbicular, reflexed, narrowed into a very short claw at the base. Wings dolabriform, falcate, obtuse, shorter than the keel. Keel incurved, obtuse, equalling the standard. Upper stamen free; the others connate into a sheath. Ovary sessile, densely silky, linear-oblong, gradually narrowed into the style; ovules 3–5; style long, slender, incurved, longitudinally bearded on the inner side above; stigma minute, terminal. Pod about $\frac{1}{3}$ in. long, more or less silky, short, turgid, ovoid or orbicular-rhomboid, straight in front, rounded at the back. Seed solitary, transversely oblong; radicle long, with a double flexure.—*Ill. N.Z. Fl.* i (1914) t. 31A.

South Island: Foothills of the seaward Kaikoura Mountains, near the mouth of the Clarence River, alt. 1500–2500 ft., *G. Stevenson!* Avon Valley, *H. F. Hursthouse! C. Teschemaker.* November–January.

A very singular and beautiful plant, which should find its way into general cultivation.

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4. **NOTOSPARTIUM** Hook. f. 1859.

Leafless shrubs with slender much-compressed pendulous branchlets. Flowers rather small, in lateral racemes. Calyx campanulate, 5-toothed; teeth short, about equal. Standard obovate-obcordate, narrowed into a short claw, shortly reflexed; wings oblong, shorter than the keel, with an incurved auricle at the base; keel hatchet-shaped, obtuse. Upper stamen free, remainder connate into a sheath. Ovary sessile or nearly so, linear; ovules numerous; style incurved. Pod shortly stipitate, linear, straight or falcate, compressed, 3–10-jointed, membranous, indehiscent; beak short. Seeds 1 to each joint, oblong; radicle twisted, with a double flexure.

A genus of three closely allied species, all three confined to New Zealand. It has the leafless habit of *Carmichaelia*, *Corallospartium*, and *Chordospartium*, but differs in the many-jointed linear pods and in other respects. The species are difficult of discrimination in the absence of fruit, but have recently been excellently reviewed by Mr. Petrie.

Racemes densely flowered; rhachis, pedicels, and calyces silky-pubescent. Pods $\frac{1}{3}$–$\frac{2}{3}$ in. long, thin, flat, strongly curved, slightly torulose	1. *N. Carmichaeliae.*
Racemes more open; pedicels and calyces almost glabrous. Pods nearly terete, straight or nearly so, not torulose ..	2. *N. glabrescens.*
More slender. Flowers never crowded in the racemes; pedicels and calyces almost glabrous. Pods $\frac{3}{4}$–1 in. long, narrow, straight or falcate, very strongly torulose	3. *N. torulosum.*

1. **N. Carmichaeliae** *Hook. f. Handb. N.Z. Fl.* (1864) 51.—A slender much-branched shrub 6–12 ft. high. Branchlets $\frac{1}{6}$–$\frac{1}{8}$ in. broad, glabrous, compressed, grooved, furnished with distant alternate scales. Leaves only seen on young plants, 1-foliolate, obcordate or orbicular, entire or emarginate, sometimes mucronate. Racemes often crowded on the branchlets for a considerable distance, simple, 1–2 in. long, 8–20-flowered;

pedicels longer than the calyces, and with the rhachis silky-pubescent. Flowers crowded, $\frac{1}{4}$–$\frac{1}{3}$ in. long, pink. Calyx silky; teeth short, triangular. Pods $\frac{1}{3}$–$\frac{2}{3}$ in. long, thin, flat, strongly curved, 3–8-jointed. Seeds 1 to each joint, orbicular-reniform.—*Bot. Mag.* t. 6741; *T. Kirk Students' Fl.* (1899) 117; *Cheesem. Man. N.Z. Fl.* (1906) 119; *Ill. N.Z. Fl.* i (1914) t. 36.

South Island: Apparently confined to the district between the Wairau and Awatere Rivers, Marlborough. Waihopai River, *Monro;* Upper Awatere, *Sinclair, T. Kirk!* Upcot (Awatere), *J. Stevenson!* Avondale (near Renwicktown), *B. C. Aston!* Omaka River, near Blenheim, *B. C. Aston!* 800–2000 ft. *Pink Broom.* December–January.

A very handsome and singular species.

2. **N. glabrescens** *Petrie in Trans. N.Z. Inst.* liii (1921) 366.—A small round-headed tree 15–30 ft. high, with a trunk 4–8 in. diam. Lower branches usually pendulous; the upper erect or ascending. Branchlets compressed, striate, $\frac{1}{10}$–$\frac{1}{8}$ in. diam. Inflorescence racemose, very similar to that of *N. Carmichaeliae*, but not so dense, and almost glabrous. Racemes 1–2 in. long; pedicels short, slender, and with the rhachis quite glabrous. Flowers $\frac{1}{3}$ in. to nearly $\frac{1}{2}$ in. long, purplish; calyx glabrous or faintly pubescent, teeth short, narrow-triangular. Standard rounded in front, marked with numerous delicate purplish veins diverging from the base, and with a large purplish blotch covering more than $\frac{1}{2}$ its surface. Wings shorter than the keel, oblong, obtuse; claw narrow. Pods $\frac{1}{3}$–$\frac{3}{4}$ in. long, $\frac{1}{5}$ in. wide, slightly flattened or almost terete, subacute or shortly apiculate, not torulose, more or less wrinkled or veined. Seeds $\frac{1}{12}$ in. diam., red, more or less mottled with black spots.

South Island: Marlborough—Awatere Valley, *T. Kirk;* mouth of Clarence River, *G. Stevenson!* throughout the upper basin of the Clarence River and its tributary valleys, *B. C. Aston!*

Very closely allied to *N. Carmichaeliae*, so far as habit and inflorescence are concerned. But the larger and nearly terete pods are so different from those of *N. Carmichaeliae* that its separation as a distinct species can hardly be disputed.

3. **N. torulosum** *T. Kirk Students' Fl.* (1899) 117.—A much-branched glabrous shrub 4–8 ft. high; branches flexuous or trailing in young plants, pendulous in the mature stage. Branchlets very slender, $\frac{1}{20}$–$\frac{1}{15}$ in. diam., terete or slightly compressed at the tips, finely grooved or striate. Leaves only seen in young plants, 1-foliolate, broadly oblong or obovate to orbicular, emarginate. Inflorescence racemose; the racemes wide apart, long and slender, 1$\frac{1}{2}$–2 in. long or even more; flowers never crowded, $\frac{1}{3}$ in. long, much narrower than in *N. Carmichaeliae* or *N. glabrescens*, purple. Calyx narrow-companulate; teeth short and broad, obtuse, glabrous or faintly pubescent. Standard narrower than in the preceding species, with a large purple blotch at the base, from which purplish lines radiate to the margin; wings rather shorter than the keel. Pods $\frac{3}{4}$–1 in. long, $\frac{1}{15}$ in. wide, straight or falcate, compressed, indehiscent, very strongly torulose, joints 6–12 or even more; style long, persistent. Seeds 1 to each joint, reniform, compressed.—*Cheesem. Man. N.Z. Fl.* (1906) 120.

South Island: South-east Nelson to mid-Canterbury. Mason River, *Haast! Spencer, S. D. Barker, Cockayne;* Whaleback (Amuri), *H. J. Matthews;* Mount Kautu, *R. M. Laing!* Rakaia Gorge, *A. Wall;* Mount Peel, *H. H. Allan! R. M. Laing.* December–January.

The most distinct species of the genus. The weak slender habit, long few-flowered racemes, narrow flowers, and particularly the long and narrow torulose pods are all well-marked characters.

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5. **CLIANTHUS** Banks and Sol. 1832.

Glabrous or villous herbs or undershrubs, usually woody below; branches weak, ascending or spreading, sometimes almost climbing. Leaves pinnate; leaflets numerous. Flowers large, red, in pendulous racemes. Calyx campanulate, 5-toothed. Standard acuminate, sharply reflexed over the calyx; wings much shorter, lanceolate or oblong; keel equalling the standard, boat-shaped, incurved, acute. Ovary stipitate; ovules numerous; style subulate, incurved, bearded below the apex. Pod terete, narrow-oblong, turgid, beaked. Seeds numerous, reniform.

Besides the New Zealand species, which is endemic, there is one from Australia, and another (perhaps not truly congeneric) from the Island of Ceram.

1. **C. puniceus** *Banks and Sol. ex Lindl. in Trans. Hort. Soc.* Ser. ii (1835) 521.—A very handsome much-branched undershrub 3–6 ft. high, more or less clothed with appressed silky pubescence; branches spreading, younger ones succulent, almost herbaceous. Leaves 3–6 in. long, unequally pinnate; leaflets 8–14 pairs, ½–1 in. long, sessile, linear-oblong, obtuse or retuse. Racemes 6–15-flowered, pendulous. Flowers bright-scarlet, 2–3 in. long. Standard ovate, acuminate; wings lanceolate, falcate, acute, less than ½ the length of the keel; keel large, falcate, acuminate. Pods 2–3 in. long, turgid, many-seeded.—*Lindl. Bot. Reg.* t. 1775; *A. Cunn. Precur.* (1838) n. 572; *Raoul Choix* (1846) 49; *Hook. f. Fl. Nov. Zel.* i (1853) 49; *Handb. N.Z. Fl.* (1864) 52; *T. Kirk Students' Fl.* (1899) 118; *Cheesem. Man. N.Z. Fl.* (1906) 120. Donia punicea *Don Syst.* ii (1832) 468.

Var. **maximus** *T. Kirk l.c.*—Leaflets larger, sometimes 1½ in. long. Flowers rather smaller. Standard broadly ovate, acuminate, often with a dark spot at the base; wings oblong, broad, rounded at the apex.—C. maximus *Col. in Trans. N.Z. Inst.* xviii (1886) 294.

North Island: Exceedingly rare and local in a wild state, and fast becoming extinct. It has been recorded from the following localities, but has certainly disappeared from several of them. Small islets in the Bay of Islands, such as Motuarohia Island, *Banks* and *Solander!* and Taranaki Island, *Colenso.* Limestone Island and McLeod's Bay, Whangarei, *R. Mair.* Great Barrier Island, *T. Kirk.* Thames, *T. Kirk.* Flat Island, near Howick, *T. F. C.*, not uncommon in 1878, but has been extinct for many years. Mercury Bay, *A. Cunn. Precur.* (1838) n. 572. East Cape district—Anaura Bay (Tigadu) and Tolaga Bay, *Banks* and *Solander!* (1769). Still exists on Motu-o-roi Island, off Anaura, and East Cape Island, *Bishop Williams.* Inland from Tolaga Bay; cliffs at Tokomaru Bay; Mangatokerau Gorge; Tiniroto; road to Morere; cliffs on Lake Waikaremoana, and gorge near the Reinga Falls, *H. Hill.* *Kowhai-ngutu-kaka.* August–November.

The brilliancy of the flowers renders this plant a universal favourite, and it is now commonly cultivated in gardens throughout the Dominion under the name of "red kowhai." I agree with Mr. Kirk in considering that Mr. Colenso's *C. maximus* is not entitled to the rank of a species. Mr. H. Hill informs me that in the East Cape localities the flowers vary considerably in colour, size, and in the shape and relative proportions of the petals. At Tolaga and Tokomaru the flowers are large, and the standard very broad, with a whitish stripe on each side near the base. At Waikaremoana the flowers are comparatively small and reddish-purple. A white-flowered variety is said by the Maoris to grow on the Tiniroto Cliffs. Possibly this is the source of the white-flowered form sometimes grown in gardens, which I have proved to come true from seed.

6. **SWAINSONA** Salisb. 1806.

Herbs or undershrubs. Stems erect or prostrate, sometimes climbing. Leaves unequally pinnate; leaflets usually numerous. Flowers in axillary racemes. Calyx campanulate, 5-toothed; teeth nearly equal. Standard

orbicular or reniform, spreading or reflexed, shortly clawed; wings oblong, falcate or slightly twisted; keel broad, incurved, obtuse or produced into a twisted beak. Upper stamen free; remainder connate into a sheath. Ovary sessile or stalked; ovules numerous; style slender, incurved, bearded along the inner edge. Pod ovoid or oblong, turgid or inflated, membranous or coriaceous, 2-valved or almost indehiscent. Seeds several, small, usually reniform.

With the exception of the following species, which is endemic in New Zealand, the genus is confined to Australia. It is very closely allied to the northern genera *Colutea* and *Astragalus*.

1. **S. novae-zealandiae** *Hook. f. Handb. N.Z. Fl.* (1864) 51.—A small herbaceous perennial 2–4 in. high, more or less clothed with silky pubescence. Rhizome creeping, slender. Stems numerous, erect or spreading, branched above. Leaves 1–2 in. long; leaflets 6–8 pairs, $\frac{1}{4}$ in. long, opposite, oblong or narrow-obovate, obtuse or retuse, sessile. Stipules broadly ovate, obtuse. Racemes 3–8-flowered, on stout peduncles longer or shorter than the leaves; pedicles not equalling the calyx, bracteolate at the base. Flowers purplish, $\frac{1}{3}$ in. long. Calyx silky-hairy, with linear teeth as long as the tube, 2-bracteolate at the base. Pod large, inflated, 1 in. long, acute at both ends; valves thin, coriaceous. Seeds 5–10, small.—*T. Kirk Students' Fl.* (1899) 118; *Cheesem. Man. N.Z. Fl.* (1906) 121.

var glabra Armstr. T. 75 (1905) 188.

South Island: Nelson—Mountains flanking the Clarence Valley, *W. T. L. Travers, T. F. C.* Marlborough—Kaikoura Mountains, *Buchanan!* Canterbury—Kowai River, *Haast!* Coleridge Pass, *J. D. Enys! T. Kirk!* Mount Arrowsmith, *Cockayne* and *R. M. Laing.* Otago—Mount St. Bathan's, *Petrie!* Mount Ida, *H. J. Matthews!* 2000–5000 ft. December–January.

7. CANAVALIA DC. 1825.

Climbing or prostrate herbs, often of large size. Leaves 3-foliolate, stipellate. Flowers rather large, in axillary racemes. Calyx-limb 2-lipped; the upper lip large and projecting, entire or 2-lobed; the lower shortly 3-toothed. Standard broad, reflexed; wings shorter, oblong or linear, falcate or twisted; keel incurved, obtuse or obtusely rostrate. Stamens all connate into a tube; anthers uniform. Ovary shortly stipitate; ovules numerous; style filiform, beardless; stigma terminal. Pod large, oblong or linear, 2-valved, with a distinct rib on each valve near the upper suture. Seeds rounded or oblong, compressed; hilum linear.

Species about 12; 2 or 3 of them, including the New Zealand one, widely spread in the tropics, the remainder mostly American.

1. **C. obtusifolia** *DC. Prodr.* ii (1825) 404.—Stems long, trailing, glabrous or the young shoots silky-pubescent. Leaflets 2–4 in. long, broadly obovate or orbicular, obtuse or emarginate, texture firm. Racemes few-flowered, on stout erect peduncles 6–10 in. long, usually overtopping the leaves. Flowers pinkish. Standard orbicular, $\frac{3}{4}$ in. diam. Pod 4–5 in. long by 1 in. broad, the longitudinal wings very narrow. Seeds 2–8.—*Benth. Fl. Austral.* ii (1864) 256; *T. Kirk Students' Fl.* (1899) 121; *Cheesem. Man. N.Z. Fl.* (1906) 122.

Kermadec Islands: Scrambling over rocks and shrubs at Coral Bay, Sunday Island, and on Meyer and Napier Islands; *T. F. C., W. R. B. Oliver!*

A common plant on the shores of almost all tropical countries, and abundant on both Norfolk Island and Lord Howe Island.

Sophora longicarinata, Simp. & Thomson.

A small tree to about 5 m. high; older branches reddish-brown, rough by old leaf scars, furrowed and irregularly covered by old pubescence, young branches and petioles yellow-green, minutely pubescent. Leaves 10-18 cm. long; 1 cm. broad; leaflets opposite or subopposite or alternate, 20-40 pairs, shortly petiolate, small ± 4 mm. long, 2-2.5 mm. broad; on young plants smaller, obovate cuneate or almost orbicular, dark green and glabrate above, lighter green, most minutely pubescent and keeled below. Flowers lemon colour, ± 5 cm. long, 3-5 on a short stipulate rhachis, stipules small, bluntly rounded; rhachis 2 cm. long, pubescent; pedicels 3 cm. long deflexed, frequently looped, pale yellow-green, pubescent, calyx 1.5 cm. long, yellow-green, pubescent, with broad, shallow, red-tipped teeth, standard 3.5 cm. long, 2.5 cm. broad; wings 4 mm. longer, 1 cm. broad; keel 1 cm. longer than the standard, linear oblong; stamens unequal, as long as the keel; style equallying the stamens and keel. Pods 5-12 cm. long, irregularly interrupted, 4 winged Seeds 3-5, oblong, 8 mm. x 5 mm. slightly compressed, pale brown, yellow at the hilum and its margin.

Type specimens in the Herbarium, Plant Research Bureau, Wellington, collected by Mr. A.W. Wastney at Takaka, Nelson.

Trans. Roy. Soc. N.Z. Vol 72. (1943) p 23

Edwardsia tetraptera, (Miller)

oliv. = (Sophora tetraptera Mill.)

T.N.Z.I. vol. 53, p. 364.

Edwardsia prostrata, (Buch.)

oliv. = (Sophora prostrata, Buch.)

T.N.Z.I. vol. 53, p. 563.

pinnate; leaflets very numerous, 25–35 pairs, shortly petiolate, small, $\frac{1}{4}$–$\frac{1}{3}$ in. long, rarely more, oblong or obovate, sometimes nearly orbicular, obtuse or slightly emarginate, when young clothed with fulvous silky hairs.

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Kermadec Islands: Scrambling over rocks and shrubs at Coral Bay, Sunday Island, and on Meyer and Napier Islands, *T. F. C., W. R. B. Oliver!*

A common plant on the shores of almost all tropical countries, and abundant on both Norfolk Island and Lord Howe Island.

8. **SOPHORA** Linn.

Small trees or shrubs. Leaves imparipinnate. Flowers in racemes or panicles, large, showy. Calyx oblique, broadly campanulate; teeth very short. Standard broadly obovate or nearly orbicular, erect or spreading; wings oblong, oblique, shorter than the keel. Stamens 10, free or rarely obscurely connate at the base; anthers versatile. Ovary shortly stipitate; ovules numerous; style incurved; stigma minute, terminal. Pod moniliform, elongated, terete or 4-winged or -angled, fleshy or coriaceous or woody, indehiscent or 2-valved, each seed enclosed in a separate cell. Seed oblong to globose, few or many.

A genus of between 25 or 30 species, mainly from the tropics and the warm temperate zones. The New Zealand species belong to the section *Edwardsia*, often kept as a distinct genus, and which is characterized by the short standard exserted stamens, and usually 4-winged pod.

In the first edition of this work I followed Hooker and Bentham in combining all the New Zealand forms under one species, but I am now fully convinced that the differences are much too important to be treated in such a manner.

Young plants without divaricating branches. Pinnae 12–25 pairs, $\frac{2}{3}$–1 in. long. Flowers large, 2 in. long. Standard $\frac{1}{4}$ shorter than the wings	1. *S. tetraptera.*
Young plants with divaricating branches. Pinnae 25–40 pairs. Flowers smaller, $1\frac{1}{2}$ in. long. Standard as long as the wings ..	2. *S. microphylla.*
Branches always divaricating. Pinnae 2–5 pairs. Flowers small, $\frac{1}{2}$–$\frac{3}{4}$ in. Standard as long as the wings. Pods small ..	3. *S. prostrata.*

Edwardsia microphylla (Aiton) Salisb.

(Sophora microphylla Ait.)

T.N.Z.I. vol. 53, p. 364.

Edwardsia tetraptera, (Miller)

oliv. = (Sophora tetraptera Mill.)

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KERMADEC ISLANDS: [illegible]
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1808.

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W. R. B. O.

1. **S. tetraptera** (*Mill.*) *Ic. Plant.* (1760) t. 1.—A small tree 25–40 ft. high, with a trunk ranging from 1 to 2 ft. diam.; bark greyish-brown. Branches terete; branchlets clothed with silky fulvous pubescence. Leaves exstipulate, unequally pinnate, 3–6 in. long; pinnae 12–25 pairs, sessile or very shortly petioled, $\frac{2}{3}$–1 in. long, linear-oblong, obtuse, often emarginate, quite entire, usually clothed on both surfaces with short and fine fulvous silky hairs. Young plants not markedly different in habit or foliage from older ones. Flowers in 4–8-flowered axillary racemes, large, $1\frac{1}{2}$–2 in. long, golden-yellow. Standard $\frac{1}{4}$ shorter than the wings, broadly oblong or oblong-orbicular, shortly clawed at the base, obviously reflexed. Wings oblong, obtuse, with comparatively short claws; keel nearly straight. Pod pedicelled, 3–8 in. long, 4-winged, jointed, indehiscent. Seeds oblong, yellow or yellowish-brown.—*Forst. f. Prodr.* (1786) n. 183 (*in part*); *Linn. f. Suppl.* (1781) 230; *Bot. Mag.* (1792) t. 167; *Ait. Hort. Kew.* ed. 1, vol. ii, 344; *Hook. f. Handb. N.Z. Fl.* (1864), *var.* grandiflora, 52; *T. Kirk Students' Fl.* (1899) 122; *Cheesem. Man. N.Z. Fl.* (1906) 122. Edwardsia grandiflora *Salisb. in Trans. Linn. Soc.* ix (1808) 299; *A. Rich. Fl. Nouv. Zel.* (1832) 344; *A. Cunn. Precur.* (1839) n. 571; *Hook. f. Fl. Nov. Zel.* i (1853) 52.

North Island: From the East Cape southwards to the Ruahine Range, but not common. Sea-level to 1500 ft. October.

Easily separated from the following species by the larger linear-oblong pinnae, which are sometimes quite 1 in. in length, by the larger flowers, and by the standard being considerably shorter than the wings.

2. **S. microphylla** *Ait. Hort. Kew.* ii (1789) 43.—A small tree 20–30 ft. high; trunk seldom as much as 3 ft. diam.; bark greyish-brown. Branchlets clothed with silky fulvous pubescence when young. Leaves unequally pinnate; leaflets very numerous, 25–35 pairs, shortly petiolate, small, $\frac{1}{4}$–$\frac{1}{3}$ in. long, rarely more, oblong or obovate, sometimes nearly orbicular, obtuse or slightly emarginate, when young clothed with fulvous silky hairs.

Young trees with divaricating and usually much interlaced branches. Flowers in 4–6-flowered axillary racemes 1–1½ in. long. Standard narrower than *S. tetraptera*, as long as the wings or nearly so, shortly clawed at the base, hardly reflexed. Wings narrow-oblong, shortly clawed at the base. Pod much as in *S. tetraptera*.—*Bot. Mag.* t. 1442. Sophora tetraptera *var.* microphylla *Hook. f. Handb. N.Z. Fl.* (1864) 53; *T. Kirk Forest Fl.* (1889) t. 51; *Students' Fl.* (1899) 122; *Cheesem. Man. N.Z. Fl.* (1906) 123. S. chathamica *Cockayne in Trans. N.Z. Inst.* xxxiv (1902) 319 (*name only*). Edwardsia microphylla *Salisb. in Trans. Linn. Soc.* ix (1808) 299; *A. Rich. Fl. Nouv. Zel.* (1832) 344; *A. Cunn. Precur.* (1839) n. 570. E. grandiflora *var.* microphylla *Hook. f. Fl. Nov. Zel.* i (1853) 52.

North and South Islands: From the North Cape to Southland, not uncommon, particularly by the banks of rivers, &c. Sea-level to 2500 ft. *Kowhai.* October–November.

The most widely distributed species, and the most variable. Mr. Kirk has characterized, in his "Forest Flora," a variety in which both leaves and flowers are unusually small; and another form exists on Banks Peninsula which seems to approach *S. tetraptera*. I regret that I do not possess sufficient material to justify me in expressing a decided opinion regarding either of them.

A remarkable variety, of which a single plant, originally brought from limestone rocks in the Takaka district, Nelson, is now cultivated in Mr. Treadwell's garden at Wellington, has very slender branchlets bearing leaves 3–4 in. long, with extremely small pinnae from $\frac{1}{12}$ to $\frac{1}{8}$ in. long. These are obovate or oblong-obovate, obtuse, and when young are covered with soft fulvous tomentum. The flowers are as large as or even slightly larger than those of typical *S. microphylla*. I have only seen three pods, of which one has a single cell, one two cells, and the remaining one three. If specimens from the original locality conform to the above characters, I think that this plant is at least worthy of varietal distinction, in which case it should bear the name of *S. Treadwellii*.

S. microphylla has been recorded from Easter Island, the Juan Fernandez Group, and Chile. But Dr. Skottsberg, in his two excellent publications on the florulas of Easter Island and Juan Fernandez (which are well worth the attention of New Zealand botanists), finds that the Easter Island *Sophora* is a distinct species, known as *S. toromiro*. Dr. Skottsberg records two species of *Sophora* from the Juan Fernandez Group—*S. Fernandeziana* Phil. and *S. Masafuezana* Skottsberg. He also gives a full account of their differences from *S. microphylla*. The exigencies of space prevent me from quoting this in full; but it may be remarked that both the Easter Island and Juan Fernandez species differ from *S. microphylla* in the unwinged pods. With respect to Chile, Dr. Skottsberg states, "No specimen from Chile that I have come across matches *S. microphylla*, but all are very like it in most respects."

3. **S. prostrata** (*Buch*) *in Trans. N.Z. Inst.* xvi (1884) 395, t. 36.—A much-branched rigid shrub 2–5 ft. high; branches divaricating, often interlaced, frequently forming prostrate or depressed sheets not more than a foot or two in height. Branchlets stout, zigzag, the younger ones more or less silky-pubescent. Leaves $\frac{1}{3}$–$\frac{1}{2}$ in. long, silky when young, glabrous when mature; leaflets 2–4 pairs, $\frac{1}{8}$–$\frac{1}{6}$ in. long, oblong or oblong-ovate, sessile or nearly so, obtuse at both ends. Flowers small, solitary or 2–3 together, $\frac{1}{2}$–$\frac{3}{4}$ in. long, bright-yellow; calyx silky. Standard hardly shorter than the wings. Pod short, 2–3-jointed, downy when young; seeds 2–3, large for the size of the pod, reddish-brown or dusky-brown, $\frac{1}{4}$ in. long or slightly more.—Sophora tetraptera *var.* prostrata *T. Kirk Forest Fl.* (1889) t. 52; *Students' Fl.* (1899) 123; *Cheesem. Man. N.Z. Fl.* (1906) 123.

South Island: From Marlborough southwards to South Canterbury. Hills in the Awatere Valley, *Buchanan!* *J. H. Macmahon!* near Cheviot, *Haast!* Hurunui River, *Spencer!* Waimakariri Gorge, *Cockayne;* Banks Peninsula, common on rocky ground, *R. M. Laing, Cockayne.* Altitudinal level 250–2500 ft. October.

G. chathamica T. 34 (1902) 319. name only.

A remarkable little plant, which with its divaricately branched habit appears to permanently match the juvenile state of *S. microphylla*. Buchanan described it as a prostrate shrub "12–18 in. high," and in the absence of further information I described it as such in the first edition of this work. But Mr. J. H. Macmahon, who has forwarded me an excellent series of specimens collected in the Awatere Valley, informs me that it is better described as a densely branched shrub 3–6 ft. high, and Dr. Cockayne has made a similar statement. (See Trans. N.Z. Inst., vol. 1 (1918) 184.)

T. 71 (–) 81. T. 72 ( ) 325.

Family LII. GERANIACEAE.

Herbs or shrubs, very rarely trees. Leaves opposite or alternate, usually stipulate. Flowers regular or irregular, generally hermaphrodite. Sepals 5, seldom fewer, free or united to the middle, imbricate or rarely valvate, posterior one sometimes spurred. Petals as many at the sepals, hypogynous or slightly perigynous. Torus barely expanded into a disc, with or without 5 glands alternating with the petals, usually raised in the centre into a beak. Stamens generally twice the number of the petals or fewer by suppression; filaments usually connate at the base; anthers 2-celled. Ovary 3–5-lobed, cells the same number; carpels 3–5, adnate to the axis as far as the beak; ovules 1–2 to each carpel. Fruit a 3–5-lobed capsule, often splitting from below upwards into as many 1-seeded carpels with long styles, which coil up elastically. Seeds with scanty or no albumen; embryo straight or curved.

4. 53

This family, as treated by Kunth in the "Pflanzenreich," where it is confined to Geranium and Pelargonium with their immediate allies, now contains 11 genera and about 600 species. About three-quarters of the species are natives of South Africa; but the family is also fairly well represented in the North Temperate Zone. Many of the species are highly ornamental, and are much used in horticulture. The two New Zealand genera have a wide range.

Flowers regular. Perfect stamens 10	1. GERANIUM.
Flowers irregular, with a spur adnate to the pedicel. Perfect stamens 5–7	2. PELARGONIUM.

See Pflanzenreich 63

1. GERANIUM Linn. 1753.

Annual or perennial herbs, rarely woody at the base. Leaves opposite or alternate, usually palmately lobed or cut, stipulate. Peduncles axillary, bracteate, 1–2-flowered. Flowers regular. Sepals 5. Petals 5, hypogynous, imbricate, alternating with 5 glands. Stamens 10, usually all perfect, rarely 5 without anthers, free or connate at the base. Ovary 5-lobed and 5-celled, with a long beak terminated by 5 stigmas; ovules 2 in each cell, superposed. Capsule splitting from below upwards into 5 carpels with long styles, which roll up elastically; seeds 1 in each carpel.

A well-known genus, comprising over 200 species, widely distributed over the whole world, but most abundant in the Northern Hemisphere. One of the New Zealand species is endemic; 3 extend to Australia and temperate South America; the remaining 2 are found in most temperate regions.

Densely softly pilose, usually annual; rootstock slender. Carpels wrinkled; seeds smooth	1. *G. molle.*
Sparingly pilose; annual or perennial; rootstock slender. Stems stout; leaves large, 4–5-lobed; almost glabrous; lobes broad	2. *G. dissectum* var. *glabratum.*
Stems prostrate and with the leaves silky-hoary; the leaves large and broad. Peduncles 1-flowered. Flowers ¾ in. diam. ..	3. *G. Traversii.*
Perennial; rootstock stout, swollen. Stems 12–15 in., silky-pilose. Leaves cut to the base into 5–7 segments, segments narrow ..	4. *G. pilosum.*

Stems prostrate, slender, silky; leaves cut into 5–7 segments. Peduncles 1-flowered. .. .. 5. *G. microphyllum.*
Small, stemless or nearly so. Rootstock short, stout. Peduncles 1-flowered. Seeds smooth .. .. 6. *G. sessiliflorum.*

1. **G. molle** *Linn. Sp. Plant.* (1753) 682.—A diffuse or procumbent much-branched annual or perennial, more or less softly pilose in all its parts; stems 6–12 in. long. Radical leaves numerous, on long slender petioles; blade orbicular, 1–2 in. diam., 5–9-lobed to below the middle; lobes obovate or cuneate, irregularly lobed or crenate. Cauline leaves smaller, on shorter petioles, with fewer but deeper divisions. Peduncles shorter than the leaves, 2-flowered. Flowers small, purplish. Sepals broadly ovate, mucronate. Petals deeply notched, barely exceeding the sepals. Carpels usually distinctly marked with transverse wrinkles. Seeds smooth, not reticulated.—*Hook. f. Fl. Nov. Zel.* i (1853) 40; *Handb. N.Z. Fl.* (1864) 37; *T. Kirk Students' Fl.* (1899) 81; *Cheesem. Man. N.Z. Fl.* (1906) 90; *Kunth in Pflanzenr.* Heft 53 (1912) 57.

Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Abundant throughout, ascending to over 2500 ft. in the South Island. Common in Europe, north Africa, and western Asia; and naturalized in other countries.

There can be little doubt that this is introduced, but as it has had a place given to it in previous works on New Zealand plants, and as it is now found in all soils and situations, and would certainly be considered indigenous by a stranger unacquainted with its history, it appears best to retain it in the Flora.

2. **G. dissectum** *Linn. Cent.* i (1755) 21, n. 62; *var.* **glabratum** *Hook. f. Fl. Nov. Zel.* i (1853) 39.—Annual or perennial, rootstock usually slender. Stems much and widely branched, procumbent, ascending at the tips, 12–15 in. long or more, sparingly clothed with spreading or retrose hairs; lamina orbicular or reniform in outline, 4–5-lobed to below the middle, the lobes broader than in typical *G. dissectum* and sparingly pilose, sometimes subglabrous on the upper surface. Peduncles variable in length, longer or shorter than the petioles, 2-flowered. Sepals ovate, acuminate or awned. Petals broadly obcordate, entire or slightly emarginate, rather longer than the sepals. Seeds reticulate.—*Handb. N.Z. Fl.* (1864) 36; *T. Kirk Students' Fl.* (1899) 80; *Cheesem. Man. N.Z. Fl.* (1906) 88; *Kunth in Pflanzenr.* Heft 53 (1912) 52.

North and South Islands: Probably not uncommon, but often confused with large states of *G. pilosum*, from which it is best separated by the larger size, leaves larger and not so deeply divided, with broader flatter lobes, which are often subglabrate above.

3. **G. Traversii** *Hook. f. Handb. N.Z. Fl.* (1867) 726.—A perennial herb, more or less hoary in all its parts with short and dense silvery-white hairs; stems decumbent or prostrate, 1–2 ft. long. Radical leaves on long slender petioles 4–9 in. long; blade 1–3 in. diam., orbicular in outline, 5–7-lobed to the middle; lodes cuneate, toothed or lobed at the tips, silky-hoary on both surfaces. Cauline leaves much smaller and on much shorter petioles. Stipules broadly ovate, cuspidate. Peduncles 1–4 in. long, 1-flowered, with 2 acuminate bracts about the middle. Flowers large, $\frac{3}{4}$–1 in. diam., white or pink. Sepals broadly ovate, cuspidate. Petals broad-obovate, entire, much longer than the sepals. Carpels silky-pilose. Seeds very minutely reticulated.—*Buch. in Trans. N.Z. Inst.* vii (1875) t. 13, f. 2; *T. Kirk Students' Fl.* (1899) 80; *Cheesem. Man. N.Z. Fl.* (1906) 89; *Ill. N.Z. Fl.* i (1914) t. 25.

Var. **elegans** *Cockayne in Trans. N.Z. Inst.* xliv (1912) 9.—Altogether similar to the type, but flowers always pink.

CHATHAM ISLANDS: Not uncommon on coastal cliffs, but seldom seen far from the sea, *H. H. Travers, J. D. Enys! F. A. D. Cox! Cockayne.*

Differs from all the forms of *G. dissectum*, to which it was referred by the late Baron Mueller, in the silvery-hoary pubescence, 1-flowered peduncles, large flowers, and minutely reticulated seeds.

4. **G. pilosum** *Forst. f. Prodr.* (1786) n. 531.—Rootstock usually stout and swollen, sometimes 1 in. thick. Stems 1–2 ft. long, branched, decumbent at the base, ascending above, often [illegible] reading petioles hairs; to the bed or lanceo- ally set acteate. Petals [illegible], obovate, emarginate. Carpels hairy, even.—*Willd. Sp. Plant.* iii (1800) 706; *A. Cunn. Precur.* (1839) n. 593; *A. Rich. Fl. Nouv. Zel.* (1832) 295. G. dissectum *var.* carolinianum *Hook. f. Handb. N.Z. Fl.* (1864) 36. G. dissectum *var.* australe *Benth. Fl. Austral.* i (1863) 296 (*in part*); *T. Kirk Students' Fl.* (1899) 79; *Cheesem. Man. N.Z. Fl.* (1906) 88.

Var. **grandiflorum** *R. Kunth in Pflanzenr.* Heft 53 (1912) 75.—Petals twice as long as the calyx, $\frac{1}{3}$ in. long or more.—G. patulum *Forst. f. Prodr.* (1786) n. 530.

NORTH AND SOUTH ISLANDS: Abundant from the North Cape southwards. Sea-level to 2000 ft.

I have followed Kunth's monograph of the family in separating Forster's *G. pilosum* from *G. dissectum*. I find that Mr. Maiden, in his "Census of New South Wales Plants," had previously taken the same course, remarking that "*G. dissectum* is an annual with a thin root, and *G. pilosum* a perennial (or rarely biennial) with a thick fleshy root."

5. **G. microphyllum** *Hook. f. Fl. Antarct.* i (1844) 8, t. 5.—A slender much-branched prostrate and straggling perennial 6–18 in. long, more or less pubescent with appressed silky white hairs, which are sometimes retrorse on the peduncles and pedicels. Leaves on long slender petioles; blade $\frac{1}{2}$–1 in. diam., orbicular in outline, cut to the middle or below into 3–7 broad or narrow obcuneate lobes, which are more or less deeply toothed at the tips; stipules small. Peduncles 1-flowered, rarely 2-flowered; flowers usually white. Sepals ovate-lanceolate, barely awned. Petals longer than the sepals, entire or slightly retuse. Carpels smooth and even, pilose. Seeds longitudinally striated, reticulations long and narrow, not conspicuous.—*Hook. f. Handb. N.Z. Fl.* (1864) 36; *T. Kirk Students' Fl.* (1899) 80; *Cheesem. Man. N.Z. Fl.* (1906) 89. G. potentilloides *Hook. f. Fl. Nov. Zel.* i (1853) 40 (*not of L'Herit*). G. dissectum *var.* potentilloides *Benth. Fl. Austral.* i (1863) 296.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, AUCKLAND ISLANDS: Common from the North Cape southwards, ascending to 3000 ft. Endemic.

This differs from all the forms of *G. dissectum* in the more slender habit, less deeply lobed and smaller leaves, 1-flowered peduncles, paler flowers, and in the much smaller and narrower reticulations on the seeds. The Australian and Tasmanian plant referred by Bentham to *G. dissectum* as var. *potentilloides* is now considered by Kunth and other botanists to be the same as *G. microphyllum*.

Stems prostrate, slender, silky; leaves cut into 5–7 segments. Peduncles 1-flowered. .. .. 5. *G. microphyllum.*
Small, stemless or nearly so. Rootstock short, stout. Peduncles 1-flowered. Seeds smooth .. .. 6. *G. sessiliflorum.*

1. **G. molle** *Linn. Sp. Plant.* (1753) 682.—A diffuse or procumbent much-branched annual or perennial, more or less softly pilose in all its parts; stems 6–12 in. long. Radical leaves numerous, on long slender petioles; blade orbicular, 1–2 in. diam., 5–9-lobed to below the middle; lobes obovate or cuneate, irregularly lobed or crenate. Cauline leaves smaller, on shorter petioles, with fewer but deeper divisions. Peduncles shorter than the leaves, 2-flowered. Flowers small, purplish. Sepals bro
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Geranium?
Gerianum molle, Linn.
not native to N.Z. see T.N.Z.I.
vol. 57, p. 65. (Ckn. & Allan).

There can be little doubt that this is introduced, but as it has had a place given to it in previous works on New Zealand plants, and as it is now found in all soils and situations, and would certainly be considered indigenous by a stranger unacquainted with its history, it appears best to retain it in the Flora.

2. **G. dissectum** *Linn. Cent.* i (1755) 21, n. 62; *var.* **glabratum** *Hook. f. Fl. Nov. Zel.* i (1853) 39.—Annual or perennial, rootstock usually slender. Stems much and widely branched, procumbent, ascending at the tips, 12–15 in. long or more, sparingly clothed with spreading or retrose hairs; lamina orbicular or reniform in outline, 4–5-lobed to below the middle, the lobes broader than in typical *G. dissectum* and sparingly pilose, sometimes subglabrous on the upper surface. Peduncles variable in length, longer or shorter than the petioles, 2-flowered. Sepals ovate, acuminate or awned. Petals broadly obcordate, entire or slightly emarginate, rather longer than the sepals. Seeds reticulate.—*Handb. N.Z. Fl.* (1864) 36; *T. Kirk Students' Fl.* (1899) 80; *Cheesem. Man. N.Z. Fl.* (1906) 88; *Knuth in Pflanzenr.* Heft 53 (1912) 52.

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4. **G. pilosum** *Forst. f. Prodr.* (1786) n. 531. — Rootstock usually stout and swollen, sometimes 1 in. thick. Stems 1–2 ft. long, branched, decumbent at the base, ascending above, often covered with soft spreading or retrorse hairs, rarely almost glabrous. Lower leaves on slender petioles 4–6 in. long which are usually covered with spreading or reversed hairs; upper leaves on shorter petioles, uppermost sessile. Lamina cut to the base or nearly so into 5–7 segments, which are again deeply lobed or partite; lobes cuneate, more or less rounded at the top. Stipules lanceolate, acuminate. Peduncles equalling the petioles in length, usually set with spreading hairs, but sometimes subglabrous, 1–2-flowered, bracteate. Flowers very variable in size. Sepals ovate, abruptly acuminate. Petals exceeding the calyx, obcordate, emarginate. Carpels hairy, even.—*Willd. Sp. Plant.* iii (1800) 706; *A. Cunn. Precur.* (1839) n. 593; *A. Rich. Fl. Nouv. Zel.* (1832) 295. G. dissectum *var.* carolinianum *Hook. f. Handb. N.Z. Fl.* (1864) 36. G. dissectum *var.* australe *Benth. Fl. Austral.* i (1863) 296 (*in part*); *T. Kirk Students' Fl.* (1899) 79; *Cheesem. Man. N.Z. Fl.* (1906) 88.

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G. brevicaule Hk.f. Fl. N.Z. 1:40 & J. Bot. 1834 1:252.

6. **G. sessiliflorum** *Cav. Diss.* (1787) 198, t. 77, f. 2. — A depressed almost stemless perennial, more or less covered with spreading or retrorse silky hairs. Rootstock stout and woody, often branched above. Leaves mostly radical, numerous, crowded, on long slender petioles; blade $\frac{1}{4}$–$\frac{3}{4}$ in. diam., orbicular, deeply divided into 3–5-toothed or -lobed segments; stipules broad, membranous. Flowering stems very short or quite undeveloped. Peduncles usually 1-flowered, short, seldom equalling the leaves. Flowers small. Sepals oblong, shortly awned, silky. Petals white, exceeding the sepals. Carpels even, minutely hairy. Seeds smooth, not reticulated.—*Hook. f. Handb. N.Z. Fl.* (1864) 36; *Benth. Fl. Austral.* i (1863) 297; *T. Kirk Students' Fl.* (1899) 80; *Cheesem. Man. N.Z. Fl.* (1906) 89; *Kunth in Pflanzenr.* Heft 53 (1912) 83.

Var. **glabrum** *Kunth in Engl. Bot. Jahrb.* xxxvii (1906) 565. — Peduncles and petioles pilose with adpressed retrorse hairs. Leaves glabrescent.

North and South Islands, Stewart Island: Not uncommon from the Lower Waikato southwards, ascending to 3000 ft. Also in Victoria, Tasmania, and temperate South America.

Easily distinguished from all the other species by the small size, stemless habit, and even seeds.

2. PELARGONIUM L'Herit. 1787.

Herbs or shrubs. Leaves opposite or rarely alternate, entire toothed lobed or variously divided. Flowers usually in few- or many-flowered umbels on axillary peduncles, irregular. Sepals 5, the uppermost produced into a short spur adnate to the pedicel. Petals 5 or fewer by abortion, the 2 upper different from the others and usually larger. Disc without glands. Stamens 10, hypogynous, connate at the base, 5–7 (rarely fewer) fertile, the remainder without anthers or rudimentary. Ovary 5-lobed, 5-celled, beaked; beak terminated by 5 short styles, which are longitudinally stigmatose; ovules 2 in each cell. Capsule splitting into 5 carpels with long styles, which roll up elastically; seeds 1 in each carpel.

Species about 200, most of which are South African, but a few are Mediterranean. Four species are Australian, one of which extends to New Zealand.

1. **P. inodorum** *Willd. Enum.* ii (1809) 702.—A decumbent or erect simple or branched more or less hairy herb 6–18 in. high; rootstock stout, Leaves on slender petioles 2–6 in. long; blade 1–2 in. diam., ovate-cordate or orbicular-cordate, obscurely 3–5-lobed; lobes finely crenate-serrate, obtuse; stipules broad. Peduncles longer than the leaves; umbels 10–12-flowered. Flowers small, $\frac{1}{4}$–$\frac{1}{3}$ in. diam., pink. Sepals ovate, acute, hairy; spur usually very short. Petals from $\frac{1}{3}$ to $\frac{1}{2}$ as long again as the sepals, spathulate, notched. Fertile stamens 5, the remainder reduced to membranous scale-like staminodia. Carpels very hairy, their beaks long, lined on the inner face with long soft white hairs.—*Pers. Syn.* ii (1807) 229; *DC. Prodr.* i (1824) 659. P. australe *var.* erodioides *Benth. Fl. Austral.* i (1863) 299. P. australe *var.* clandestinum *Hook. f. Handb. N.Z. Fl.* (1864) 37. P. australe *Willd. Sp. Plant.* iii (1800) 675; *T. Kirk Students' Fl.* (1899) 82; *Cheesem. Man. N.Z. Fl.* (1906) 91. P. clandestinum *L'Her. ex DC. l.c.* 660; *A. Cunn. Precur.* (1839) n. 595; *Raoul Choix* (1846) 47; *Hook. f. Fl. Nov. Zel.* i (1853) 41.

North and South Islands, Stewart Island, Chatham Islands: Abundant from the Three Kings Islands and the North Cape southwards, ascending to 2500 ft. *Kopata.* November–February.

Although I have followed Kunth in placing this under *P. inodorum*, I have grave doubts as to whether it would not have been better to keep it under *T. australe*, as Hooker and Kirk left it.

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OXALIS Linn.

Herbs, stemless or caulescent. Leaves all radical or alternate, compound, usually 3-foliolate, stipulate or exstipulate. Flowers regular, on axillary 1- or more-flowered peduncles. Sepals 5, imbricate. Petals 5, hypogynous, contorted. Disc without glands. Stamens 10, free or connate at the base, all anther-bearing. Ovary 5-lobed, 5-celled; styles 5, distinct; ovules 1 or more in each cell. Capsule loculicidally dehiscing, the valves persistent on the axis. Seeds with an outer fleshy coat which bursts elastically; testa crustaceous; albumen fleshy.

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Var. **ciliifera** *A. Cunn. l.c.*—Stems procumbent, filiform, matted. Leaflets membranous, ciliated.—O. tenuicaulis *A. Cunn. l.c.* n. 589.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS: Abundant throughout, chiefly in lowland situations.

One of the most widely diffused and variable plants known, found in almost all temperate and tropical countries.

OXALIS: acc. to Knuth, Pflanzenreich 95 Heft (iv. 130) 1930.

1. Caulis supraterraneus, + elatus vel procumbero-2. Caulis supraterraneus nullus. Rhizoma + crassiusculom, + carnosum, horizontale, saepe squamis + incrassatis obsitum - magellanicum.
2. Caulis adpresse pubescens, plerumque copisse Capsulae pubescentes - stricta. Caulis laxe pubescens, saepe subglater Capsula glabra (exe. O. corniculata) - corniculata.

petioles pilose with adpresse

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Easily distinguished from all the other species by the small size, stemless habit, and even seeds.

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Herbs or shrubs. Leaves opposite or rarely alternate, entire toothed lobed or variously divided. Flowers usually in few- or many-flowered umbels on axillary peduncles, irregular. Sepals 5, the uppermost produced into a short spur adnate to the pedicel. Petals 5 or fewer by abortion, the 2 upper different from the others and usually larger. Disc without

Stamens 10, hypogynous, connate at the base, 5–7 (rarely fewer)

O. corniculata L. spec. pl. ed. 1. 1. (1753) 435. O. corniculata var. cilifera (Cunn.) et crassifolia (Cunn.) Hook.f. Handb. N.Zeal. Fl. (1867) 38. O. cilifera, O. exilis, O. tenuicaulis A.Cunn. in Ann. Nat. Hist. Sev. 1 111 (1839) 316. O. crassifolia A. Cunn. l.c. 317.
Var. L. corniculata Zucc. in Abl. Akad. Muenel 1 (1825-30) 230. Caules prostrati vel repentes, zicut toba planba + pilosi. Pedunculi subquinquiflori. Capsulae pubescentes. Neu Seeland (J. S. Hooker!; Heusler a. 1897! Lesson a. 1825!) Auckland (Cockayne a, 1910, n.7176!)
Var. B. repens (Thunb.) Zucc. l.c. O.macrophylla A.Cunn. Caules pernumerosi, prostrati. Folia multo minna, + glauca.

Oliver. Illus. Fl. [illegible]

A. Cunn. Precur. (1839) n. 595; *Raoul Choix* (1846) 47; *Hook. f. Fl. Nov. Zel.* i (1853) 41.

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Family LIII. **OXALIDACEAE.**

Stemless or caulescent herbs, rarely shrubs; rootstock creeping, bulbous, or tuberous. Leaves alternate, petiolate, usually digitately compound; stipules generally present; leaflets often obcordate. Flowers regular, hermaphrodite. Sepals 5, often unequal. Petals 5, equal, inserted on the receptacle. Stamens 10–15, inserted on the receptacle, free or connate at the base. Ovary 5-celled, 5-lobed; styles free or connate; ovules 2 to many in each cell. Fruit a globose or cylindric capsule, rarely a berry. Seeds pendulous; testa crustaceous; albumen fleshy, abundant. Embryo straight, axile.

A small family of 7 genera, containing about 300 species, most of which are African. It is closely allied to Geraniaceae, from which it is chiefly separated by the capsular fruit.

OXALIS Linn.

Herbs, stemless or caulescent. Leaves all radical or alternate, compound, usually 3-foliolate, stipulate or exstipulate. Flowers regular, on axillary 1- or more-flowered peduncles. Sepals 5, imbricate. Petals 5, hypogynous, contorted. Disc without glands. Stamens 10, free or connate at the base, all anther-bearing. Ovary 5-lobed, 5-celled; styles 5, distinct; ovules 1 or more in each cell. Capsule loculicidally dehiscing, the valves persistent on the axis. Seeds with an outer fleshy coat which bursts elastically; testa crustaceous; albumen fleshy.

A large genus of over 250 species, chiefly found in South America and South Africa, with a few widely dispersed in most parts of the world.

More or less pubescent, diffusely branched from the base. Stipules present. Peduncles 1–3-flowered. Flowers yellow	1. *O. corniculata.*
Subglabrous. Stem erect, but often with runners below. Stipules wanting. Peduncles 3–8-flowered. Flowers yellow	2. *O. stricta.*
Stem short or wanting. Peduncles radical, 1-flowered. Flowers white	3. *O. lactea.*

1. **O. corniculata** *Linn. Sp. Plant.* (1753) 435.—A more or less pubescent much-branched prostrate or decumbent delicate perennial herb, branches sometimes ascending at the tips. Leaves alternate, 3-foliolate, on long or short petioles, stipules small, adnate to the petioles; leaflets broadly obcordate, $\frac{1}{8}$–$\frac{3}{4}$ in. long, thin and membranous, often glaucous beneath. Peduncles axillary, 1–4-flowered, about as long as the petioles; capsule oblong-cylindric, $\frac{1}{2}$ in. long, usually clothed with appressed pubescence. Seeds few or many.—*Hook. f. Fl. Nov. Zel.* i (1853) 42; *Handb. N.Z. Fl.* (1864) 38; *T. Kirk Students' Fl.* (1899) 83; *Cheesem. Man. N.Z. Fl.* (1906) 91.

O. repens Sol. ex Forst. f. 519 (1786)

Var. **microphylla** *Hook. f. l.c.* — Stems procumbent, slender, rooting. Leaflets usually minute. Capsule oblong.—(?) O. exilis *A. Cunn. Precur.* (1839) n. 587.

Var. **ciliifera** *A. Cunn. l.c.*—Stems procumbent, filiform, matted. Leaflets membranous, ciliated.—O. tenuicaulis *A. Cunn. l.c.* n. 589.

Kermadec Islands, North and South Islands: Abundant throughout, chiefly in lowland situations.

One of the most widely diffused and variable plants known, found in almost all temperate and tropical countries.

2. **O. stricta** *Linn. Sp. Plant.* (1753) 435.—Stem erect, much and diffusely branched below or even prostrate at the base, 4–12 in. high, subglabrous or slightly pubescent with appressed hairs. Leaves pale-green, very similar to those of *O. corniculata* but rather larger; stipules wanting. Peduncles slender, 3–6 in. long, 3–8-flowered, spreading in fruit. Capsules usually glabrous, large, ½–1 in. long. Seeds numerous.—O. ambigua *A. Rich. Fl. Nouv. Zel.* (1832) 296. O. Urvillei, O. propinqua, O. divergens, O. lacicola, *A. Cunn. Precur.* (1839) 584, 586, 588, 590. O. corniculata *var.* stricta *Hook. f. Fl. Nov. Zel.* i (1853) 42; *Handb. N.Z. Fl.* (1864) 38; *Benth. Fl. Austral.* i (1863) 301; *T. Kirk Students' Fl.* (1899) 83; *Cheesem. Man. N.Z. Fl.* (1906) 92.

North and South Islands: Not uncommon throughout in lowland districts.

In the first edition of this work I included this with *O. corniculata*, in agreement with the views of Hooker and Bentham, but now most botanists treat it as a distinct although closely allied species. It is best distinguished by the more erect habit, absence of stipules, and the more numerous flowers in the cymes.

3. **O. lactea** *Hook. Comp. Bot. Mag.* i (1835) 276.—A small glabrous or pubescent almost stemless herb 2–4 in. high; rootstock creeping, scaly. Leaves all radical, on long slender hairy petioles, trifoliolate; leaflets obcordate, glabrous, glaucous beneath. Peduncles radical, long and slender, often exceeding the leaves, 2-bractiolate above the middle, 1-flowered. Flowers rather large, pure-white, ⅓–½ in. diam. Sepals small, ovate, obtuse. Petals obovate or obcordate, often oblique. Capsule globose.—O. cataractae *A. Cunn. Precur.* (1839) n. 585; *Hook. Ic. Plant.* (1842) t. 418; *Raoul Choix* (1846) 47. O. magellanica *Hook. f. Fl. Nov. Zel.* i (1853) 42, t. 13; *Handb. N.Z. Fl.* (1864) 38 (*not of Forst. f. in Comm. Gotting.* (1789) 33); *Benth. Fl. Austral.* i (1863) 300; *T. Kirk Students' Fl.* (1899) 84; *Cheesem. Man. N.Z. Fl.* (1906) 92.

North and South Islands: From Mangonui and Kaitaia southwards, in damp and shaded or subalpine places. Also in Australia and Tasmania. Sea-level to fully 4000 ft.

In the "Flora Novae-Zelandiae" Hooker identified this charming little plant with the South American *O. magellanica;* and in this he has been followed by all subsequent botanists. But Dr. Skottsberg, in a memoir dealing with "The Relations between the Floras of Subantarctic America and New Zealand," points out that the New Zealand plant differs from the Fuegian in the flowers being double the size, in the longer pedicels, and in the distinctly obcordate leaves with a narrow base. Influenced by these differences, he has taken up the name of *O. lactea* Hook., being the one first applied to the Australian and New Zealand species. As the plant appears worthy of specific distinction I have adopted the name in this place.

Family LIV. LINACEAE.

Herbs or shrubs, rarely trees. Leaves alternate, simple, usually entire; stipules present or wanting. Flowers regular, hermaphrodite. Sepals 5, rarely 4, free or coherent at the base, imbricate. Petals the same number, hypogynous or slightly perigynous, imbricate, often contorted. Stamens as many as the petals or twice as many, rarely more; filaments united below into a ring which frequently has 5 small glands at the base; anthers 2-celled, versatile. Ovary free, entire, 3–5-celled; styles the same number, distinct or more or less united; ovules 1–2 in each cell, pendulous, anatropous. Fruit either a capsule splitting into 3–5 cocci, or more rarely a drupe. Seeds 1–2 in each cell; albumen fleshy or wanting; embryo usually straight, radicle superior.

O. stricta L. Spec. pl. ed. 1 (1753) 434. O. Urvillei, O. laxicola, O. propinqua, O. divergens A. Cunn. in Ann. Nat. Hist. Ser.1 III. (1839) 316. (P.144). Auf der ganzen gemassighen nordlichen Hemisphare heimisch. Nach.Neu-Seeland und dem aquatrialen Apitea eingeschleppt. Neu-Seeland: Wellington (Travers, Pl. Neu Zealand, a. 1909!)

5 glands opposite to the petals and adnate to the staminal ring. Ovary 5-celled, with 2 ovules in each cell; cells sometimes divided into 2; styles 5. Capsule 5-celled septicidally splitting into 5 [illegible]

O. magellanica Forst. in Comm. Gotting. IX (1789) 33, O. cataractae A. Cunn. in Ann. Nat. Hist. Sev. I. III. (1893) 315 - O. Novae. zelandiae Cdgr. in Bull. Soc. Bot. Fr. LIX (1912) 706. - Acetonella magellanica (Forst.) O. Kuntze, Rev. Gen. I (1891) 92 - O. lactea Hook. Comp. Bot. Mag. 1 (1835) 376. Neu-Seeland (J. D. Hooker!, Cheeseman!); Greymouth (Helms 2, 1882-83!); Wellington (Travers a. 1908!). Nach Skottsberg und Cheeseman (Man. ev.) Fl. 1925, 536) ist O. lactea Hook (Australien, Neu-Seeland, Tasmania) als eigene Art anzusehen. (P.230).

...aped or flaked with pale-blue. — Petals 3/ 320.

T. 144 - 143.

North and South Islands, Stewart Island, Chatham Islands: Abundant on rocky places along the coasts, and occasionally found inland, ascending to over 2000 ft. in both the North and South Islands, usually on the faces of cliffs. October–January. Var. *chathamicum* occurs on the mainland as well as on the Chatham Islands.

Family LV. **RUTACEAE.**

Trees or shrubs, very rarely herbs, plentifully supplied with pellucid glands filled with an aromatic or pungent essential oil. Leaves opposite or alternate, simple or compound, exstipulate. Flowers regular, hermaphrodite or rarely unisexual. Calyx 4–5-lobed or divided into as many free sepals, imbricate. Petals the same number, hypogynous or slightly perigynous, imbricate or valvate. Stamens usually free, hypogynous, as many or twice as many as the petals, rarely more numerous; anthers 2-celled, versatile. Disc placed between the stamens and ovary, usually

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plant differs from the Fuegian in the flowers being double the size, in the longer
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these differences, he has taken up the name of *O. lactea* Hook., being the one first
applied to the Australian and New Zealand species. As the plant appears worthy of
specific distinction I have adopted the name in this place.

Family LIV. **LINACEAE.**

Herbs or shrubs, rarely trees. Leaves alternate, simple, usually entire; stipules present or wanting. Flowers regular, hermaphrodite. Sepals 5, rarely 4, free or coherent at the base, imbricate. Petals the same number, hypogynous or slightly perigynous, imbricate, often contorted. Stamens as many as the petals or twice as many, rarely more; filaments united below into a ring which frequently has 5 small glands at the base; anthers 2-celled, versatile. Ovary free, entire, 3–5-celled; styles the same number, distinct or more or less united; ovules 1–2 in each cell, pendulous, anatropous. Fruit either a capsule splitting into 3–5 cocci, or more rarely a drupe. Seeds 1–2 in each cell; albumen fleshy or wanting; embryo usually straight, radicle superior.

A small family, scattered over the whole world, the herbaceous species mainly temperate, the shrubby almost all tropical. Genera 10; species about 140. The common flax, *Linum usitatissimum*, so valuable from the tenacity of its fibre and its oily seeds, is the most important member of the family. The only New Zealand genus is widely distributed.

LINUM Linn.

Herbs, rarely shrubby at the base. Leaves usually alternate, narrow, quite entire; stipules generally wanting. Flowers in panicled or racemose or fascicled cymes. Sepals 5, entire. Petals 5, contorted in aestivation, fugacious. Stamens 5, alternate with the petals, hypogynous, usually connate at the base, often alternating with 5 minute staminodia. Disc of 5 glands opposite to the petals and adnate to the staminal ring. Ovary 5-celled, with 2 ovules in each cell; cells sometimes divided into 2; styles 5. Capsule 5-celled, septicidally splitting into 5 2-seeded or 10 1-seeded cocci. Seeds compressed, albumen scanty.

A genus of 90 species or more, mostly natives of temperate or subtropical climates. The single indigenous species is endemic.

(The Australian *L. marginale* A. Cunn. is now plentifully naturalized in many parts of New Zealand, especially to the north of Taranaki and Hawke's Bay. It can be distinguished from *L. monogynum* by its smaller size, more slender habit, and small pale-blue flowers.)

1. **L. monogynum** *Forst. f. Prodr.* (1786) n. 145.—A very variable perfectly glabrous perennial herb, sometimes woody at the base; stems few or many, simple or branched, erect or spreading, 6–24 in. high. Leaves numerous, scattered, ascending, ¼–1 in. long, linear-oblong to linear-lanceolate or linear-subulate, 1–3-nerved. Flowers in terminal corymbs, white, often large and handsome, sometimes 1 in. diam. Sepals ovate or ovate-lanceolate, acute. Styles united at the base, their tips free, recurved. Capsule large, broadly ovoid, splitting into 10 1-seeded cocci.—*A. Rich. Fl. Nouv. Zel.* (1832) 317; *A. Cunn. Precur.* (1839) n. 608; *Hook. Bot. Mag.* t. 3574; *Raoul Choix* (1846) 47; *Hook. f. Fl. Nov. Zel.* i (1853) 28; *Handb. N.Z. Fl.* (1864) 35; *T. Kirk Students' Fl.* (1899) 77; *Cheesem. Man. N.Z. Fl.* (1906) 87.

Var. **chathamicum** *Cockayne in Trans. N.Z. Inst.* xxxiv (1902) 320.—Petals broadly striped or flaked with pale-blue.

North and South Islands, Stewart Island, Chatham Islands: Abundant on rocky places along the coasts, and occasionally found inland, ascending to over 2000 ft. in both the North and South Islands, usually on the faces of cliffs. October–January. Var. *chathamicum* occurs on the mainland as well as on the Chatham Islands.

Family LV. **RUTACEAE.**

Trees or shrubs, very rarely herbs, plentifully supplied with pellucid glands filled with an aromatic or pungent essential oil. Leaves opposite or alternate, simple or compound, exstipulate. Flowers regular, hermaphrodite or rarely unisexual. Calyx 4–5-lobed or divided into as many free sepals, imbricate. Petals the same number, hypogynous or slightly perigynous, imbricate or valvate. Stamens usually free, hypogynous, as many or twice as many as the petals, rarely more numerous; anthers 2-celled, versatile. Disc placed between the stamens and ovary, usually

annular, entire or lobed or crenate. Ovary of 4–5 free or connate carpels; styles as many, free at the base, united above; ovules usually 2 in each carpel. Fruit very various, sometimes of 4–5 2-valved cocci, or a berry or drupe, rarely a capsule with loculicidal dehiscence. Seeds generally solitary in each cell; albumen fleshy or wanting; embryo large, straight or curved, radicle superior.

As defined by Hooker and Bentham in the "Genera Plantarum," this is a large and heteromorphous family, comprising between 80 and 90 genera and nearly 700 species. Most of the species are either tropical or inhabit South Africa or Australia. They are comparatively rare in the North Temperate Zone. The chief characteristic of the family is the presence of an essential oil, which is usually abundant in the leaves and young growing parts, often giving them an aromatic odour and bitter or pungent taste. The orange, lemon, citron, lime, &c., are the chief economic species. The two New Zealand genera are also found in Australia, and *Melicope* extends into the Pacific islands as well.

Leaves simple, petiole terete. Flowers 5-merous .. .. 1. PHEBALIUM.
Leaves compound, or if simple with the petioles winged. Flowers 4-merous .. .. 2. MELICOPE.

1. **PHEBALIUM** Vent. 1804.

Shrubs. Leaves alternate, simple, entire or slightly toothed, pellucid-dotted. Flowers usually in axillary or terminal corymbs, rarely solitary. Calyx small, 5-lobed or -partite. Petals 5, imbricate or valvate. Stamens 8–10, longer or shorter than the petals; filaments filiform, glabrous. Ovary 2–5-partite almost to the base; style simple; stigma small, capitellate; ovules 2 in each cell, superposed. Cocci 2–5, truncate or rostrate; endocarp cartilaginous and separating elastically. Seeds usually solitary.

A genus of 35 species, all of which are confined to Australia with the exception of the present one, which is endemic in New Zealand.

1. **P. nudum** *Hook. Ic. Plant.* (1843) t. 568. — A graceful much-branched perfectly glabrous shrub 4–12 ft. high; branchlets slender, with reddish bark. Leaves alternate, 1–1½ in. long, linear-oblong or narrow oblong-lanceolate, coriaceous, obtuse, obscurely crenate, narrowed into short petioles or almost sessile, pellucid-dotted. Flowers ⅓ in. diam., white, fragrant, in terminal many-flowered corymbs; pedicels short, scurfy. Calyx very small, with 5 broad lobes. Petals 5, lanceolate or linear, obtuse; margins involute. Stamens much longer than the petals. Cocci 1–4, but usually only 1 or 2 ripen, obtusely rhomboid, wrinkled, splitting into 2 valves.—*Raoul Choix* (1846) 48; *Hook. f. Fl. Nov. Zel.* i (1853) 44; *Handb. N.Z. Fl.* (1864) 39; *T. Kirk Students' Fl.* (1899) 85; *Cheesem. Man. N.Z. Fl.* (1906) 93; *Ill. N.Z. Fl.* ii (1914) t. 26.

NORTH ISLAND: Hilly forests from Kaitaia southwards to the Thames River, ascending to 2500 ft. *Mairehau.* October–December.

Highly aromatic in all its parts. The flowers have been used for the extraction of a perfume.

2. **MELICOPE** Forst. 1776.

Trees or shrubs. Leaves opposite or alternate, simple or 3-foliolate, rarely pinnate, pellucid-dotted. Flowers usually small, often unisexual, in axillary or terminal few- or many-flowered cymes or panicles. Sepals 4. Petals 4, valvate or imbricate, with inflexed tips. Stamens 8, inserted at the base of the disc; filaments subulate. Ovary 4-lobed almost to the base, 4-celled; style single or 4 coalescing into 1; stigma capitate, 4-lobed;

ovules 2 in each cell. Cocci 1–4, distinct, spreading, 2-valved, 1-seeded; endocarp cartilaginous or horny, separating. Seeds usually solitary; testa crustaceous, shining; albumen fleshy; embryo straight or slightly curved.

Besides the two species described below, both of which are endemic, there are 10 or 12 from the Pacific islands, 2 from tropical Asia, and 3 from Australia.

Leaves large, 3-foliolate (often 1-foliolate in var. *Mantellii*); petioles terete .. .. 1. *M. ternata.*
Leaves small, 1-foliolate; petioles flat .. .. .. 2. *M. simplex.*

1. **M. ternata** *Forst. Char. Gen.* (1776) 56. — A much-branched perfectly glabrous small tree 12–20 ft. high. Leaves opposite, 3-foliolate; leaflets 2–4 in. long, linear-obovate or elliptic-oblong or oblong-ovate, acute or obtuse, entire, finely pellucid-dotted. Flowers $\frac{1}{3}$ in. diam., greenish, often unisexual, in axillary trichotomous panicles usually longer than the petioles; pedicels short. Petals ovate-oblong, longer than the stamens, concave. Ovary glabrous; style short, stout. Cocci 4, coriaceous, spreading, strongly wrinkled and punctate. Seed black and shining, attached by a slender funicle, often protruding from the half-open valves.—*A. Rich. Fl. Nouv. Zel.* (1832) 293; *A. Cunn. Precur.* (1839) n. 582; *Hook. Ic. Plant.* (1844) t. 603; *Raoul Choix* (1846) 48; *Hook. f. Fl. Nov. Zel.* i (1853) 43; *Handb. N.Z. Fl.* (1864) 40; *T. Kirk Forest Fl.* (1889) t. 66; *Students' Fl.* (1899) 86; *Cheesem. Man. N.Z. Fl.* (1906) 94; *Ill. N.Z. Fl.* i (1914) t. 27. Entoganum laevigatum *Gaertn. Fruct.* i (1788) 331, t. 68.

Var. **Mantellii** *T. Kirk Forest Fl.* (1889) t. 66.—Smaller, much branched; branches strict. Leaves usually much smaller, 3- or 1-foliolate; leaflets rounder, often obscurely crenate. Panicles 3–6-flowered.—M. Mantellii *Buch. in Trans. N.Z. Inst.* iii (1871) 212.

Kermadec Islands, North Island: Common in lowland situations. South Island: Marlborough—Seaward Kaikouras, *Cockayne.* Nelson—D'Urville Island, *T. Kirk;* coast of north Nelson, *F. W. Huffam;* Wakapuaka, *F. G. Gibbs!* Ascends to 1000 ft. *Wharangi.* September–October.

The Kermadec Island specimens have much larger and more obtuse leaflets, but do not seem to differ in other respects. Var. *Mantellii* combines the characters of *M. ternata* and *M. simplex* to an extraordinary degree, and may be a hybrid between those species.

2. **M. simplex** *A. Cunn. Precur.* (1839) n. 583.—A glabrous shrub 6–12 ft. high, with slender twiggy branches. Leaves alternate or fascicled, rarely opposite, in young plants 3-foliolate, in mature 1-foliolate; petiole flattened or narrowly winged; leaflets small, jointed on the top of the petiole, $\frac{1}{2}$–$\frac{3}{4}$ in. long, rhomboid-obovate or rounded, obtuse, doubly crenate, pellucid-dotted. Flowers often unisexual, small, greenish-white; peduncles usually several together, axillary, longer than the petioles, 1- or 3-flowered. Stamens longer than the petals in the male flowers, shorter in the females. Ovary hirsute; style very short in the male flowers, longer in the females; stigma obscurely 4-lobed. Fruit as in *M. ternata*, but smaller.—*Hook. Ic. Plant.* (1843) t. 585; *Raoul Choix* (1846) 48; *Hook. f. Fl. Nov. Zel.* i (1853) 43; *Handb. N.Z. Fl.* (1864) 40; *T. Kirk Forest Fl.* (1889) t. 68; *Students' Fl.* (1899) 86; *Cheesem. Man. N.Z. Fl.* (1906) 94. M. parvula *Buch. in Trans. N.Z. Inst.* xx (1887) 255. Astorganthus Huegelii *Endl. Cat. Hort. Vindob.* ii (1843) 196.

North and South Islands: Abundant from the North Cape to Southland, ascending to 2000 ft. September–November.

The flowers are occasionally cleistogamic. (See a paper on the subject by Mr. G. M. Thomson, in Trans. N.Z. Inst. xxiv (1892) 416.)

Family LVI. **MELIACEAE.**

Trees or shrubs; wood often hard, coloured, odorous. Leaves alternate, usually pinnate, rarely simple, exstipulate. Flowers regular, hermaphrodite, seldom unisexual. Calyx 4–5-lobed or -partite, usually imbricate. Petals 4–5, rarely more or 3 only, free or adnate to the lower part of the staminal tube, contorted imbricate or valvate. Stamens 8–10, seldom more or fewer; filaments united into a tube, rarely free; anthers generally sessile within the top of the tube. Disc within the staminal column, annular or tubular, free or connate with the ovary. Ovary generally free, 3–5-celled; style simple; ovules 2 in each cell, rarely more. Fruit usually a capsule, sometimes a berry, rarely drupaceous. Seeds often enclosed in an aril, with or without albumen.

A family of about 40 genera and 600 species, almost wholly confined to the tropics, rare in temperate regions. Most of the species are more or less bitter and astringent. Some yield a valuable and durable timber, as the mahogany (*Swietenia*), satinwood (*Chloroxylon*), and the so-called Australian cedar (*Cedrela australis*). The single New Zealand species belongs to a genus widely distributed in eastern tropical Asia.

DYSOXYLUM Blume. 1825.

Large usually glabrous trees. Leaves simple, alternate, pinnate; leaflets entire. Flowers in lax axillary panicles. Calyx small, 4–5-toothed -lobed or -partite, imbricate. Petals 4–5, linear-oblong, spreading, valvate. Staminal tube cylindrical, dentate or crenulate at the mouth; anthers 8–10, included. Disc tubular, sheathing the ovary. Ovary 3–5-celled; ovules usually 2 in each cell. Capsule globose or pyriform, coriaceous, 1–5-celled, loculicidally 2–5-valved. Seeds with or without an aril, large, oblong, exalbuminous; cotyledons very large.

A considerable genus of large forest-trees, best represented in tropical Asia and the Malay Archipelago, but with several species in Australia and the Pacific islands. The single New Zealand species is endemic.

1. **D. spectabile** (Forst. f.) *Hook. f. Handb. N.Z. Fl.* (1864) 41.—A handsome round-headed tree 25–50 ft. high; trunk 1–3 ft. in diam. Leaves unequally pinnate, glabrous, 9–18 in. long; leaflets 3–4 pairs, alternate, petioled, 3–7 in., ovate-oblong or oblong-obovate, acute, oblique at the base, undulate. Panicles 6–18 in. long, pendulous, usually springing from the trunk or branches far below the leaves, rarely axillary, sparingly branched. Flowers waxy-white, 1½ in. diam., shortly pedicelled. Calyx-lobes small, ciliate. Petals 5, linear, spreading or recurved. Staminal tube cylindric, fleshy, crenate. Style slender, exserted beyond the staminal tube; stigma discoid. Capsule large, broadly obovoid, 1 in. long, 3–4-celled. Seeds 2 in each cell, enveloped in an orange aril.—*T. Kirk Forest Fl.* (1889) tt. 64, 65; *Students' Fl.* (1899) 87; *Cheesem. Man. N.Z. Fl.* (1906) 95. Hartighsea spectabilis *A. Juss. in Mem. Mus. Par.* xix (1830) 228; *A. Cunn. Precur.* (1839) n. 597; *Raoul Choix* (1846) 47; *Hook. Ic. Plant.* (1844) tt. 616, ~~617~~; *Hook. f. Fl. Nov. Zel.* i (1853) 39. Trichilia spectabilis *Forst. f. Prodr.* (1786) n. 188; *A. Rich. Fl. Nouv. Zel.* (1832) 306.

North Island: Abundant from the North Cape southwards. South Island: Marlborough—Abundant in the Sounds, *H. J. Matthews! J. H. Macmahon!* Stephen Island, *Cockayne.* Nelson—D'Urville Island, *T. Kirk;* Pepin Island, *F. G. Gibbs!* Ascends to 1500 ft. *Kohekohe.* May–July.

Timber suitable for inlaying and furniture; leaves bitter and tonic.

T. 71 (1911) 87.

Family LVII. EUPHORBIACEAE.

Herbs or shrubs or trees of exceedingly various habit; juice milky, acrid. Leaves alternate, rarely opposite, often stipulate. Flowers usually small, unisexual (in *Euphorbia* reduced to single naked stamens surrounding a solitary pistil and enclosed within a calyx-like involucre). Perianth generally simple and calycine, but often wanting, rarely double, the inner of 4–5 minute petals. Stamens 1 to many; anthers 2-celled. Ovary superior, of 3 (rarely 2 or more than 3) united carpels; styles as many as the carpels, free or united, entire or divided; ovules 1 or 2 to each carpel, pendulous from the inner angle of the cell. Fruit either a capsule of 2-valved 1–2-seeded cocci separating from a persistent axis, or a 1–3-celled drupe, or of 1 or more combined nuts. Seed laterally attached at or above the middle of the cell; embryo straight, in the axis of fleshy albumen, cotyledons flat, radicle superior.

A large family, of about 230 genera and about 4000 species, most abundant in the tropics, rare in very cold climates. Many species are poisonous, and a considerable number yield medicinal products, as castor-oil, croton-oil, gum euphorbium, &c. Others afford a wholesome food, as the manioc and tapioca. Of the 4 genera found in New Zealand, one (*Euphorbia*) has a world-wide distribution; another (*Poranthera*) is found elsewhere only in Australia. The two remaining (*Aleurites* and *Homalanthus*) have their headquarters in the Pacific islands, but extend northwards to China and the Malay Archipelago.

* Flowers without a perianth, several males and one female in a cup-shaped calyx-like involucre .. .. 1. EUPHORBIA.

** Flowers provided with a perianth.

Low-growing herbs. Flowers in terminal racemes or heads. Anthers opening by pores .. .. 2. PORANTHERA.

Trees with digitately lobed or veined leaves. Flowers in terminal cymes. Fruit large, somewhat fleshy, with 1–3 large oily seeds 3. ALEURITES.

Trees. Flowers in slender racemes; males numerous, females few at the base of the raceme. Fruit capsular .. .. 4. HOMALANTHUS.

1. EUPHORBIA Linn.

Herbs or shrubs abounding in milky juice. Inflorescence of numerous males and a single female flower crowded in a small cup-shaped 4–5-lobed calyx-like involucre, the lobes usually alternating with as many fleshy glands, which often possess a white or coloured spreading limb. Male flowers consisting of a pedicelled stamen without floral envelopes of any kind; anther-cells globose. Female flower central in the involucre, of a long-pedicelled 3-celled ovary, also without floral envelopes; styles 3; ovules solitary in each cell. Capsule 3-lobed, splitting into 3 2-valved cocci, which fall away from a persistent axis.

A vast genus of world-wide distribution, very feebly represented in New Zealand. There are probably more than 750 species, of very diversified habit and characters. Several species from the Northern Hemisphere are naturalized in New Zealand, the most common being the milkweed, *E. Peplus*, a small glabrous annual branched from the base, with thin obovate entire leaves, an umbel of 2–3 repeatedly divided rays, smooth capsules, and pitted seeds.

Perry. Cunn. J. Bot. 1943 30: 527. 2n=40 p. 527.
Also. Phyllog. relationships.

1. **E. glauca** *Forst. f. Prodr.* (1786) n. 208.—A tall stout perfectly glabrous smooth and glaucous herb 1–3 ft. high. Stems from a creeping rhizome, erect, terete, lower portion marked with the scars of the fallen leaves, leafy above, umbellately branched at the top. Leaves crowded, 1–4 in. long, linear- or lanceolate-obovate to oblong-obovate, obtuse or mucronate, sessile, quite entire. Umbels broad; rays 5–6, each once or twice forked; floral leaves much broader than the cauline, broadly oblong. Involucres almost concealed by the floral leaves, shortly pedicelled, campanulate, $\frac{1}{4}$ in. diam.; glands 4–5, dark-purple, crescent-shaped. Capsule nearly as large as a pea, pendulous, globose, quite smooth and glabrous. Seeds smooth, greyish.—*A. Rich. Fl. Nouv. Zel.* (1832) 352; *A. Cunn. Precur.* (1838) n. 339; *Raoul Choix* (1846) 42; *Hook. f. Fl. Nov. Zel.* i (1853) 227; *Handb. N.Z. Fl.* (1864) 248; *Cheesem. Man. N.Z. Fl.* (1906) 628.

North and South Islands, Stewart Island, Chatham Islands: Common along the shores from the North Cape southwards. *Waiuatua.* October–February. Also found in Norfolk Island.

2. **PORANTHERA** Rudge. 1811.

Annual or perennial herbs, sometimes woody at the base. Leaves narrow, alternate, stipulate. Flowers racemose or subumbellate at the tips of the branches, or solitary in the axils of the upper leaves, monoecious or dioecious. Male flowers: Calyx deeply divided into 5 segments imbricate in the bud. Petals 5, small, sometimes wanting; anthers 4-celled, cells free, opening by terminal pores. Rudimentary ovary of 3 clavate bodies. Female flowers: Calyx and petals of the males. Stamens wanting. Ovary broad, 3-celled; styles 3, each divided into 2 linear branches; ovules 2 in each cell. Capsule depressed, globose, splitting into 3 2-valved cocci. Seeds reticulate; embryo terete, curved, cotyledons not broader than the radicle.

A small genus of 6 species, 5 of which are Australian, 1 of them extending to New Zealand. The remaining species is endemic in New Zealand.

Slender, diffusely branched. Leaves flat or nearly so. Flowers in terminal racemes	1. *P. microphylla.*
Compactly branched. Leaves with the margins revolute to the middle. Flowers solitary in the upper axils	2. *P. alpina.*

1. **P. microphylla** *Brong. in Dup. Voy. Coq. Bot.* 218, t. 50B.—A slender perfectly glabrous herb; branches diffuse, 6–9 in. long, prostrate at the base, ascending at the tips. Leaves opposite or alternate, $\frac{1}{4}$–$\frac{1}{2}$ in. long, linear-obovate or spathulate, obtuse, gradually narrowed into a rather long petiole; margins flat or very slightly recurved. Flowers minute, greenish-white, in terminal bracteate racemes; bracts linear-subulate, lower ones exceeding the flowers. Petals linear, usually present in both sexes. Capsule membranous, depressed. Seeds small, brown, granulate. —*Benth. Fl. Austral.* vi (1873) 56; *Cheesem. in Trans. N.Z. Inst.* xi (1879) 432; *Man. N.Z. Fl.* (1906) 628.

South Island: Nelson—*Nothofagus* forest in the Maitai Valley, *T. F. C.;* Cobb Valley (north-west Nelson), *F. G. Gibbs!* Marlborough—Pelorus and Tinline Valleys, abundant, *J. H. Macmahon!* December–January.

Widely distributed in Australia and Tasmania.

2. **P. alpina** *Cheesem. in Trans. N.Z. Inst.* xiv (1882) 300.—Perfectly glabrous, 2–5 in. high; branches numerous, decumbent or suberect, usually densely compacted and interlaced, rarely open, scarred, often somewhat woody

at the base. Leaves all uniform, opposite, crowded, sessile or very shortly petiolate, $\frac{1}{8}$–$\frac{1}{5}$ in. long, linear-oblong, obtuse, quite entire, smooth and veinless above; margins revolute, concealing the whole of the under-surface except the very thick and prominent midrib; stipules rather large, triangular. Flowers solitary in the axils of the upper leaves, forming short leafy heads, minute, greenish-white, dioecious; peduncles shorter than the leaves. Petals wanting in both sexes. Sepals 5, oblong, obtuse. Stamens shorter than the sepals; filaments slender. Ovary subglobose, 6-lobed, 3-celled. Capsule globose-depressed.—*Hook. f. in Hook. Ic. Plant.* (1881) t. 1366B; *Cheesem. Man. N.Z. Fl.* (1906) 629; *Gruning in Pflanzenr.* Heft 58.

South Island: Nelson—Rocky slopes on Mount Arthur and Mount Owen, *T. F. C.*; Mount Lockett, *F. G. Gibbs*; Mount Murchison, *W. Townson!* 3000–5000 ft. December–February.

A very peculiar little plant. It is distinguished from all the other species of the genus by the uniformly dioecious and apetalous flowers, which are solitary in the axils of the upper leaves, and by the more or less coriaceous stipules. Dr. Gruning, in his revision of the subfamilies *Porantheroideae* and *Ricinocarpoideae*, published in the "Pflanzenreich" (Heft 58), has constituted it a separate section (*Oreoporanthera*) of the genus.

3. **ALEURITES** Forst. 1776.

Trees with stellate pubescence. Leaves alternate, petiolate, large, entire or 3–7-lobed. Flowers in terminal cymes, monoecious. Male flowers: Calyx splitting into 2–3 valvate segments. Petals 5, longer than the calyx. Stamens 8–20, on a central receptacle, 5 outer opposite the petals, alternating with 5 small glands; anthers adnate, cells parallel. Female flowers: Calyx and petals of the males. Ovary 2–5-celled; styles 2–5, bifid; ovules 1 in each cell. Fruit large, drupaceous; exocarp somewhat fleshy; endocarp 1–5-celled. Seeds large; testa thick, woody; cotyledons broad, flat.

A small genus of 5 species, natives of eastern Asia and the Pacific islands.

1. **A. moluccana** *Willd. Sp. Plant.* iv (1805) 590.—A handsome spreading tree 30–40 ft. high or more; young leaves and branches more or less [illegible] with pale or fawn-coloured stellate pubescence, almost glabrous when [illegible] 4–9 in. long, [illegible]ovate, obtuse [illegible], tomentose; [illegible] tomentose. [illegible]nens 15–20; [illegible]n the males. [illegible]ta rugose.—[illegible] *st.* xx (1888) 112; *Illustr. Fl. N.Z.* i. t. (1906) 328.

Aleurites moluccana, Willd.
not native to N.Z. see T.N.Z.I.
vol. 57, p.61. (Ckn. & Allan).

Kermadec Islands: Sunday Island, not uncommon on the northern and eastern sides of the island, *T. F. C.* *Candle-nut.*

Widely distributed in the Pacific islands and tropical Asia, also extensively planted and naturalized in hot countries. The seeds or "nuts" contain an excellent oil, so that in many parts of Polynesia they are strung on sticks and used as candles, whence the English name of "candle-nut."

Perry. Cunn. J. Bot. 1943 30: 527. 2n=40 p. 527.
Also Hyslop relationships.

1. **E. glauca** *Forst. f. Prodr.* (1786) n. 208.—A tall stout perfectly glabrous smooth and glaucous herb 1–3 ft. high. Stems from a creeping rhizome, erect, terete, lower portion marked with the scars of the fallen leaves, leafy above, umbellately branched at the top. Leaves crowded, 1–4 in. long, linear- or lanceolate-obovate to oblong-obovate, obtuse or mucronate, sessile, quite entire. Umbels broad; rays 5–6, each once or twice forked; floral leaves much broader than the cauline, broadly oblong. Involucres almost concealed by the floral leaves, shortly pedicelled, campanulate, $\frac{1}{4}$ in. diam.; glands 4–5, dark-purple, crescent-shaped. Capsule nearly as large as a pea, pendulous, globose, quite smooth and glabrous. Seeds smooth, greyish.—*A. Rich. Fl. Nouv. Zel.* (1832) 352; *A. Cunn. Precur.* (1838) n. 339; *Raoul Choix* (1846) 42; *Hook. f. Fl. Nov. Zel.* i (1853) 227; *Handb. N.Z. Fl.* (1864) 248; *Cheesem. Man. N.Z. Fl.* (1906) 628.

North and South Islands, Stewart Island, Chatham Islands: Common along the shores from the North Cape southwards. *Waiuatua.* October–February. Also found in Norfolk Island.

2. **PORANTHERA** Rudge. 1811.

Annual or perennial herbs, sometimes woody at the base. Leaves narrow, alternate, stipulate. Flowers racemose or subumbellate at the tips of the branches, or solitary in the axils of the upper leaves, monoecious or dioecious. Male flowers: Calyx deeply divided into 5 segments imbricate in the bud. Petals 5, small, sometimes wanting; anthers 4-celled, cells free, opening by terminal pores. Rudimentary ovary of 3 clavate bodies. Female flowers: Calyx and petals of the males. Stamens wanting. Ovary broad, 3-celled; styles 3, each divided into 2 linear branches; ovules 2 in each cell. Capsule depressed, globose, splitting into 3 2-valved cocci. Seeds reticulate; embryo terete, curved, cotyledons not broader than the radicle.

A small genus of 6 species, 5 of which are Australian, 1 of them extending to New Zealand. The remaining species is endemic in New Zealand.

Slender, diffusely branched. Leaves flat or nearly so. Flowers in terminal racemes	1. *P. microphylla.*
Compactly branched. Leaves with the margins revolute to the middle. Flowers solitary in the upper axils	2. *P. alpina.*

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Widely distributed in Australia and Tasmania.

2. **P. alpina** *Cheesem. in Trans. N.Z. Inst.* xiv (1882) 300.—Perfectly glabrous, 2–5 in. high; branches numerous, decumbent or suberect, usually densely compacted and interlaced, rarely open, scarred, often somewhat woody

at the base. Leaves all uniform, opposite, crowded, sessile or very shortly petiolate, $\frac{1}{8}$–$\frac{1}{5}$ in. long, linear-oblong, obtuse, quite entire, smooth and veinless above; margins revolute, concealing the whole of the under-surface except the very thick and prominent midrib; stipules rather large, triangular. Flowers solitary in the axils of the upper leaves, forming short leafy heads, minute, greenish-white, dioecious; peduncles shorter than the leaves. Petals wanting in both sexes. Sepals 5, oblong, obtuse. Stamens shorter than the sepals; filaments slender. Ovary subglobose, 6-lobed, 3-celled. Capsule globose-depressed.—*Hook. f. in Hook. Ic. Plant.* (1881) t. 1366B; *Cheesem. Man. N.Z. Fl.* (1906) 629; *Gruning in Pflanzenr.* Heft 58.

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A small genus of 5 species, natives of eastern Asia and the Pacific islands.

1. **A. moluccana** *Willd. Sp. Plant.* iv (1805) 590.—A handsome spreading tree 30–40 ft. high or more; young leaves and branches more or less clothed with pale or ferruginous stellate pubescence, almost glabrous when old. Leaves crowded towards the ends of the branches, 4–9 in. long, very variable in shape, ovate-lanceolate to broadly rhomboid-ovate, obtuse or acute, entire or 3–5- or 7-lobed. Cymes broad, much branched, tomentose; pedicels short. Flowers numerous, white. Calyx very small, tomentose. Petals about $\frac{1}{4}$ in. long, obovate, bearded at the base. Stamens 15–20; filaments short, hairy. Female flowers fewer and smaller than the males. Fruit 2 in. diam., smooth, fleshy; seeds 1–2, rarely 3; testa rugose.—*Benth. Fl. Austral.* vi (1873) 128; *Cheesem. in Trans. N.Z. Inst.* xx (1888) 172; *Man. N.Z. Fl.* (1906) 629.

Kermadec Islands: Sunday Island, not uncommon on the northern and eastern sides of the island, *T. F. C.* *Candle-nut.*

Widely distributed in the Pacific islands and tropical Asia, also extensively planted and naturalized in hot countries. The seeds or "nuts" contain an excellent oil, so that in many parts of Polynesia they are strung on sticks and used as candles, whence the English name of "candle-nut."

4. **HOMALANTHUS** A. Juss. 1824.

Glabrous shrubs or small trees. Leaves alternate, petiolate, broad, entire, often glaucous; stipules deciduous. Flowers in terminal racemes, small, apetalous, monoecious. Male flowers: Very numerous, occupying all the upper portion of the raceme. Calyx of 1 or 2 minute flat appressed sepals. Stamens 6–50; filaments very short; anther-cells distinct, divaricate, longitudinally 2-valved. Female flowers: Few or solitary at the base of the raceme. Calyx 2–3-partite. Ovary 2–3-celled; styles 2–3, linear, entire; ovules 1 in each cell. Capsule didymous or trigonous, fleshy, indehiscent or splitting into 2–3 2-valved cocci. Seeds with a fleshy aril.

Species 7–8, scattered through the Pacific islands, Australia, and the Malay Archipelago.

1. **H. polyandrus**, *Cheesem.*—A handsome slender tree 10–25 ft. high, everywhere perfectly glabrous; branches brittle, terete, marked with the prominent scars of the fallen leaves. Leaves in young plants 3–12 in. diam., in old plants much smaller, 2–4 in. long, broadly triangular-ovate or rhomboid-orbicular, acute, membranous, somewhat undulate, glaucous beneath; petiole as long or longer than the blade; stipules $\frac{3}{4}$ in. or more. Racemes slender, erect, 4–8 in. long. Male flowers: Very numerous, rather loosely placed, $\frac{1}{12}$ in. diam.; bracts minute, 1–2-glandular at the base. Stamens about 40, very short, closely packed in a globose head. Female flowers: 1 to 4 at the base of the raceme, on long slender pedicels, drooping. Capsule $\frac{1}{2}$–$\frac{2}{3}$ in., trigonous, 3-celled, splitting into 3 cocci. Seed enveloped in a yellowish aril, frequently persistent on the axis of the fruit.—H. nutans *Hook. f. in Journ. Linn. Soc.* i (1857) 127 (*not of Guill.*). Carumbium polyandrum *Hook. f. Handb. N.Z. Fl.* (1864) 248; *Cheesem. in Trans. N.Z. Inst.* xx (1888) 172.

Kermadec Islands: Sunday Island, plentiful in 1887, *T. F. C.*; but in 1908 reduced to specimens growing in localities inaccessible to goats, *W. R. B. Oliver!* Macaulay Island: A few plants in the crater-basin (in 1887), *T. F. C.* Flowers most of the year.

Endemic, but very closely allied to the Polynesian *H. pedicellatus* Benth. (*Carumbium nutans* Muell. Arg.), principally differing in the larger number of stamens.

Family LVIII. **CALLITRICHACEAE.**

Perfectly glabrous slender herbs, usually growing in wet places, often aquatic. Leaves opposite, linear or obovate-spathulate, quite entire, the upper ones often crowded or rosulate. Flowers monoecious, minute, axillary, solitary or rarely a male and female in the same axil, without perianth. Male flowers of a single stamen subtended by two minute bracts; filaments slender, elongated; anther 2-celled, cells confluent above. Female flowers with or without the 2 bracts. Ovary sessile or shortly stalked, 4-celled; ovules solitary in each cell; styles 2, elongated, stigmatic throughout their length. Fruit flattened, indehiscent, 4-lobed and 4-celled, ultimately separating into 4 1-seeded carpels. Consists of the following genus.

Callitriche in N.Z. & Australia. R.Mason.

Aust. Journal of Bot. Vol.7. NO 3. page 295. 1959

CALLITRICHE Linn.

CALLITRICHE

1. Fruit-flesh containing oxalic acid crystals . . . . . 2.
   Fruit-flesh lacking oxalic acid crystals . . . . . 3.
2. Fruit basis strumose . . . . macropteryx
   Fruit basis not strumose . . muelleri
3. Angles of fruit rounded . . . antarctica
   " " " keeled or winged . verna

Tetrachondra Hamiltonii Petrie
Icones Plantarum Hooker. Vol.23, 111, pt.11, Sept. 1892, pl.2250.

Roy. Soc. 1866 (1867) 20.

THE SNARES, AUCKLAND AND CAMPBELL ISLANDS, ANTIPODES ISLAND, MACQUARIE ISLAND: Not uncommon on damp soil. Also found on Kerguelen Island, Falkland Islands, and South Georgia.

2. **C. verna** *Linn. Fl. Suec.* ii (1755) n. 3.—Usually floating in still [illegible] long. Leaves $\frac{1}{2}$–$\frac{3}{4}$ in. r retuse er than keeled, i (1853) 09) 156;

Callitriche verna, Linn.

not native to N.Z. see T.N.Z.I.

vol. 57, p. 62. (Ckn. & Allan).

oughout.

3. **C. Muelleri** *Sond. in Linnaea* xxviii (1886) 229. — Stems filiform, 2–9 in. long, much branched and interlaced, forming broad matted patches on damp soil. Leaves obovate-rhomboid or broadly obovate-spathulate, cuneate at the base, suddenly narrowed into a distinct petiole. Fruit orbicular-obcordate, often broader than long, flattened, margins expanded into a broad pale wing, groove between the lobes deep.—*T. Kirk Students' Fl.* (1899) 156; *Cheesem. Man. N.Z. Fl.* (1906) 158. C. verna *var.* b *Hook. f. Fl. Nov. Zel.* i (1853) 64. C. macropteryx *Hegelm. Monog. Callit.* (1864) 59, t. iv, f. 2. C. microphylla *Col. in Trans. N.Z. Inst.* xx (1888) 190.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Common from the North Cape southwards. Sea-level to 2500 ft. Also in Australia.

There seem to be two forms of this—one with a broad wing occupying a third of the whole width of the fruit, the other with a much narrower wing. The last-mentioned form was referred by Mr. Kirk to *C. obtusangula* Hegelm. Monog. Callit. (1864) 54, t. 3, f. 3; but this determination is clearly erroneous, the true *obtusangula* having rounded angles to the fruit, which is not at all winged.

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Pflanzen. 19E (1931) 239.

CALLITRICHE Linn.

Characters of the family as defined above.

A genus of very doubtful affinity, now often placed in the vicinity of the *Euphorbiaceae*. The species are estimated at from 1 or 2 to 20 or 30, according to the different views of authors.

Fruits not winged, edges almost obtuse, groove between the carpels shallow	1. *C. antarctica.*
Fruits slightly winged, edges sharply keeled, groove between the carpels rather shallow	2. *C. verna.*
Fruits broadly winged, wings pale, groove between the carpels deep	3. *C. Muelleri.*

1. **C. antarctica** *Engelm. ex Hegelm. in Verh. Bot. Ver. Brandenb.* ix (1867) 20.—Stems creeping and rooting, rather stout, succulent, densely matted, 2–6 in. long. Leaves fleshy, $\frac{1}{5}$–$\frac{1}{2}$ in. long, narrow obovate-spathulate or oblong-spathulate, rounded at the tip, narrowed into a rather long petiole. Fruit sessile, broadly oblong or almost orbicular, somewhat turgid, not winged, the edges subacute or almost obtuse, separated by a shallow groove, so that each pair of lobes is united by almost three-quarters of their breadth.—*Kidder in Bull. U.S. Nat. Mus.* iii, 23; *T. Kirk Students' Fl.* (1899) 155; *Cheesem. Man. N.Z. Fl.* (1906) 158. C. verna *var.* b terrestris *Hook. f. Antarct.* i (1844) 11. C. verna *subsp.* obtusangula *Hook. f. Phil. Trans. Roy. Soc.* 1868 (1879) 20.

The Snares, Auckland and Campbell Islands, Antipodes Island, Macquarie Island: Not uncommon on damp soil. Also found on Kerguelen Island, Falkland Islands, and South Georgia.

2. **C. verna** *Linn. Fl. Suec.* ii (1755) n. 3.—Usually floating in still water. Stems slender, sparingly branched, 3–12 in. long. Leaves $\frac{1}{2}$–$\frac{3}{4}$ in. long, linear-spathulate or oblong-spathulate or obovate, rounded or retuse at the tip, very thin and membranous. Fruit sessile, rather longer than broad, subcordate, somewhat convex, edges shortly and acutely keeled, groove between the lobes rather shallow.—*Hook. f. Fl. Nov. Zel.* i (1853) 64; *Handb. N.Z. Fl.* (1864) 68 (*in part*); *T. Kirk Students' Fl.* (1899) 156; *Cheesem. Man. N.Z. Fl.* (1906) 158.

North and South Islands: Not uncommon in streams and lakes throughout. An abundant plant in many temperate countries.

3. **C. Muelleri** *Sond. in Linnaea* xxviii (1886) 229.—Stems filiform, 2–9 in. long, much branched and interlaced, forming broad matted patches on damp soil. Leaves obovate-rhomboid or broadly obovate-spathulate, cuneate at the base, suddenly narrowed into a distinct petiole. Fruit orbicular-obcordate, often broader than long, flattened, margins expanded into a broad pale wing, groove between the lobes deep.—*T. Kirk Students' Fl.* (1899) 156; *Cheesem. Man. N.Z. Fl.* (1906) 158. C. verna *var.* b *Hook. f. Fl. Nov. Zel.* i (1853) 64. C. macropteryx *Hegelm. Monog. Callit.* (1864) 59, t. iv, f. 2. C. microphylla *Col. in Trans. N.Z. Inst.* xx (1888) 190.

Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Common from the North Cape southwards. Sea-level to 2500 ft. Also in Australia.

There seem to be two forms of this—one with a broad wing occupying a third of the whole width of the fruit, the other with a much narrower wing. The last-mentioned form was referred by Mr. Kirk to *C. obtusangula* Hegelm. Monog. Callit. (1864) 54, t. 3, f. 3; but this determination is clearly erroneous, the true *obtusangula* having rounded angles to the fruit, which is not at all winged.

Family LIX. **CORIARIACEAE.**

Glabrous shrubs, sometimes small and almost herbaceous; branches angular, the lower opposite. Leaves opposite or rarely in whorls of 3, entire, exstipulate. Flowers regular, hermaphrodite or polygamous, small, usually in axillary racemes. Sepals 5, imbricate, persistent. Petals 5, hypogynous, smaller than the sepals, keeled within, enlarged after flowering and becoming thick and fleshy and embracing the fruit. Stamens 10, hypogynous, free, or the alternate ones adnate to the petals; filaments short; anthers large. Disc absent. Carpels 5–10, free, 1-celled, whorled on a short conical receptacle; styles as many as the carpels, free, thick, elongated, covered for the whole length with stigmatic papillae; ovules solitary, pendulous from the top of the cell. Fruit of 5–10 oblong indehiscent cocci, closely embraced by the fleshy and juicy petals, 1-celled, 1-seeded. Seed with a membranous testa; albumen a thin layer only; embryo with plano-convex cotyledons and a superior radicle.

A small family of very doubtful relationship, comprising the single genus *Coriaria*. Species 8 or 10, found in New Zealand, South America, Japan, China, the Himalayas, north Africa, and south Europe.

CORIARIA Linn.

T. 42 (1910) 168
T. 57 (1926) 81.
T. 59. (1928) 725.

Characters of the family, as above.

Shrub or small tree. Leaves 1–3 in., oblong-ovate. Racemes drooping	1. *C. ruscifolia.*
Suffruticose or herbaceous. Leaves $\frac{1}{8}$–1 in., ovate-lanceolate ..	2. *C. thymifolia.*
Herbaceous. Leaves $\frac{1}{8}$–$\frac{1}{4}$ in., narrow-linear	3. *C. angustissima.*

1. **C. ruscifolia** *Linn. Sp. Plant.* (1753) 1037.—A shrub or small tree with spreading 4-angled branches, very variable in height and degree of robustness, sometimes attaining 25 ft. with a trunk 10 in. diam., at others not more than 2–4 ft., with almost herbaceous stems. Leaves 1–3 in., ovate or oblong-ovate, acute or acuminate, rounded or cordate at the base, sessile or very shortly petioled, 3–5-nerved. Racemes drooping, many-flowered, 4–12 in. long or more, slightly pubescent; pedicels slender, $\frac{1}{4}$–$\frac{1}{3}$ in., bracteolate at the base. Flowers small, green, $\frac{1}{8}$–$\frac{1}{6}$ in. diam., strongly proterogynous. Sepals broadly ovate, subacute. Filaments elongating after fertilization. Fruit globose, purplish-black, of 5–8 cocci enveloped by the persistent enlarged juicy petals.—*Hook. f. Fl. Nov. Zel.* i (1853) 45; *Handb. N.Z. Fl.* (1864) 46; *T. Kirk Forest Fl.* (1889) t. 139; *Students' Fl.* (1899) 97; *Cheesem. Man. N.Z. Fl.* (1906) 105; *Ill. N.Z. Fl.* i (1914) t. 30. C. sarmentosa *Forst. f. Prodr.* (1786) n. 377; *A. Rich. Fl. Nouv. Zel.* (1832) 364; *Bot. Mag.* (1824) t. 2470; *A. Cunn. Precur.* (1839) n. 581; *Raoul Choix* (1846) 47. C. arborea *and* C. tutu *Lindsay Contrib. N.Z. Bot.* (1868) 84.

Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Abundant throughout, ascending to 3500 ft. *Tutu; Tupakihi.*

An excessively variable plant, not only in habit of growth and size—the latter varying from 2 or 3 ft. to 25 ft. or even more—but also in the size and shape of the leaves, the number and length of the racemes, the number and size of the flowers, &c. Most parts of the plant are poisonous, and particularly the young shoots and seeds. The poisonous principle appears to be a glucoside, to which the name "tutin" has been

applied. For particulars, reference should be made to a paper by Professor Easterfield and Mr. B. C. Aston, published by the New Zealand Department of Agriculture; and to one by F. Fitchett entitled "The Physiological Action of Tutin" (Trans. N.Z. Inst. vol. xli (1909) 286-366). The juice expressed from the ripe fleshy petals, when the seeds are strained from it, is quite innocuous, and is used as a non-intoxicating drink by the Maoris.

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2. **C. thymifolia** *Humb. and Bonp. ex Willd. Sp. Plant.* iv, 819.—A small suffruticose or herbaceous plant 6 in. to 4 ft. high; rootstock often

KEY TO N.Z. SPECIES OF CORIARIA

Racemes terminal ..... 1. pottsiana, Oliv.
Racemes axillary

Leaves 1 cm. or less
  Narrow linear ..... 2. angustissima Hook.f.
  " lanceolate ..... 3. plumosa Oliv.

Leaves 1½ - 2 cm.
  Lanceolate, margin undulate ..... 4. Kingiana, Col.
  Linear-lanceolate, flat ..... 5. pteridioides, Oliv.

Leaves 4 cm. and over
  Racemes short, Semi-woody herb..... 6. sarmentosa Frst.
  Racemes long, shrub or tree ..... 7. arborea, Lindsay

HYBRIDS

Coriaria arborea x pteridioides
C. " x Kingiana
C. " x plumosa
C. angustissima x sarmentosa
C. plumosa X "
C. Kingiana x "
C. " x pottsiana

See Genus Coriaria in N.Z., W.R.B. Oliver, Rec. Dom. Mus., Vol.1, 1942.

Family LIX. **CORIARIACEAE.**

Glabrous shrubs, sometimes small and almost herbaceous; branches angular, the lower opposite. Leaves opposite or rarely in whorls of 3, entire, exstipulate. Flowers regular, hermaphrodite or polygamous, small, usually in axillary racemes. Sepals 5, imbricate, persistent. Petals 5, hypogynous, smaller than the sepals, keeled within, enlarged after flowering and becoming thick and fleshy and embracing the fruit. Stamens 10, hypogynous, free, or the alternate ones adnate to the petals; filaments short; anthers large. Disc absent. Carpels 5–10, free, 1-celled, whorled on a short conical receptacle; styles as many as the carpels, free, thick, elongated, covered for the whole length with stigmatic papillae; ovules solitary, pendulous from the top of the cell. Fruit of 5–10 oblong indehiscent cocci, closely embraced by the fleshy and juicy petals, 1-celled, 1-seeded. Seed with a membranous testa; albumen a thin layer only; embryo with plano-convex cotyledons and a superior radicle.

A small family of very doubtful relationship, comprising the single genus *Coriaria*. Species 8 or 10, found in New Zealand, South America, Japan, China, the Himalayas, north Africa, and south Europe.

applied. For particulars, reference should be made to a paper by Professor Easterfield and Mr. B. C. Aston, published by the New Zealand Department of Agriculture; and to one by F. Fitchett entitled "The Physiological Action of Tutin" (Trans. N.Z. Inst. vol. xli (1909) 286–366). The juice expressed from the ripe fleshy petals, when the seeds are strained from it, is quite innocuous, and is used as a non-intoxicating drink by the Maoris.

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2. **C. thymifolia** *Humb. and Bonp. ex Willd. Sp. Plant.* iv, 819.—A small suffruticose or herbaceous plant 6 in. to 4 ft. high; rootstock often [illegible] and branches slender, with winged angles.

Coriaria lurida, Kirk.

= (C. Thymifolia Hook f. (not Humb. & Bonpl)).

T.N.Z.I. vol. 53, p. 364.

Egmont, and Taupo southwards, not above
5000 ft. *Tutupapa.*

In its ordinary state this is distinct enough; but large-leaved forms pass direct into *C. ruscifolia*, and narrow-leaved varieties into *C. angustissima*. I cannot separate Mr. Kirk's *C. lurida* save as a trivial variety. A form with the margins of the leaves distinctly undulate, collected on both flanks of the Kaimanawa Mountains by Aston, and near Te Whaiti (Whakatane County) by Petrie, has been sent to me by Mr. Petrie under the MS. name of *C. thymifolia* var. *undulata*.

3. **C. angustissima** *Hook. f. Handb. N.Z. Fl.* (1864) 47.—Rootstock stout, branched. Stems herbaceous, slender, tufted, often covering large patches. Branches numerous, dense, almost plumose; branchlets filiform or almost capillary. Leaves very numerous, small, $\frac{1}{8}$–$\frac{1}{4}$ in. long, narrow-linear or linear-subulate, sessile or very shortly petioled, acuminate. Racemes 1–3 in. long, slender, glabrous or nearly so. Flowers small, very similar to those of *C. thymifolia*, often unisexual. Fruit rather large, globose, almost black.—*Lindsay Contrib. N.Z. Bot.* (1868) 87; *T. Kirk Students' Fl.* (1899) 98; *Cheesem. Man. N.Z. Fl.* (1906) 106.

North Island: Mount Egmont, *Dieffenbach, Gibson!* Ruahine Range, *Colenso, B. C. Aston!* Kaimanawa Mountains and Mount Holdsworth, *B. C. Aston!* South Island: Subalpine localities from the Spenser Mountains to the south-west of Otago, alt. 1500–4000 ft. Stewart Island: Ruggedy Mountains, *Poppelwell.* December–February.

Mt. Hik. v. Adams See herb.

It is almost impossible to distinguish states of this from small forms of *C. thymifolia*; but the tall fine-leaved or almost plumose variety so abundant on many portions of the Canterbury Alps has a remarkably distinct appearance.

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North and South Islands, Stewart Island: From the East Cape, Mount Egmont, and Taupo southwards, not uncommon in mountainous districts. 1000–5000 ft. *Tutupapa.*

In its ordinary state this is distinct enough; but large-leaved forms pass direct into *C. ruscifolia*, and narrow-leaved varieties into *C. angustissima*. I cannot separate Mr. Kirk's *C. lurida* save as a trivial variety. A form with the margins of the leaves distinctly undulate, collected on both flanks of the Kaimanawa Mountains by Aston, and near Te Whaiti (Whakatane County) by Petrie, has been sent to me by Mr. Petrie under the MS. name of *C. thymifolia* var. *undulata*.

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Aliens Rep. Aust. Ass. Adv. Sc. 20. 1931 444

Family LX. **CORYNOCARPACEAE.**

Small or medium-sized evergreen trees, without resin-canals. Leaves alternate, simple, exstipulate. Flowers hermaphrodite, small, arranged in terminal branched panicles. Calyx inferior, deeply 5-lobed; lobes petaloid, unequal, the two outer smaller. Petals 5, perigynous, longer than the calyx-lobes, margins erose. Stamens 5, opposite to the petals and shorter than them; filaments flattened in front; anthers dorsifixed, 2-celled, longitudinally dehiscent. Staminodia 5, alternating with the petals, oblong-spathulate; margins irregularly toothed or fringed. Disc reduced to 5 glandular lobes placed in front of the staminodia. Ovary sessile, ovoid, either 1-celled and gradually narrowed into an erect style, or imperfectly 2-celled with 2 unequal styles; stigma capitate; ovule solitary, pendulous from near the top of the cell. Fruit drupaceous, narrow-ovoid, obtuse, fleshy; endocarp fibrous. Seed pendulous; testa membranous, adhering to the cavity of the cell; cotyledons plano-convex; radicle minute, superior.

A small family composed of the single genus *Corynocarpus*, the systematic position of which is somewhat doubtful. It was at first placed in the Myrsinaceae, but afterwards was transferred by Hooker to the Anacardiaceae. But it differs markedly from that family in the total absence of resin-canals, which are present in all the other genera. Influenced mainly by that peculiarity, Engler, in "Die Naturlichen Pflanzenfamilien," described it as a new family, which is probably the best solution of the difficulty.

CORYNOCARPUS Forst. 1776.

Characters of the family, as defined above.

The genus was long supposed to consist of the single New Zealand species, but Mr. W. B. Hemsley, in an elaborate memoir printed in the "Annals of Botany" for 1903, pp. 743–60, has described two new species, one collected by Archdeacon Comins in Torres Island, New Hebrides, the other by Viellard in New Caledonia. The discovery of *Corynocarpus* in Melanesia is of considerable interest in connection with the often-quoted tradition that the New Zealand species was introduced by the Maoris when they first colonized the country. Mr. Hemsley's memoir also contains a full discussion on the relationships of the genus, and descriptions of the whole of the species.

1. **C. laevigata** *Forst. Char. Gen.* (1776) 32, t. 16.—A handsome leafy tree 30–50 ft. high, with a trunk 1–2 ft. diam. or more. Leaves 3–8 in. long, elliptic-oblong or oblong-obovate, subacute, narrowed into a short stout petiole, thick and coriaceous, dark-green and glossy, perfectly glabrous; margins slightly recurved. Panicles 4–8 in. long, broad, dense, rigid, erect, much branched; pedicels short and thick, almost fleshy. Flowers small, greenish, $\frac{1}{6}$–$\frac{1}{5}$ in. diam. Sepals almost orbicular. Petals but little longer than the sepals, obovate-spathulate; margins obscurely erose. Staminodia oblong-spathulate; margins above the middle obscurely erose-denticulate. Ovary small, glabrous; style short, thick; stigma capitate. Drupe 1–1$\frac{1}{2}$ in. long, narrow-ovoid or elliptic, rarely somewhat oblique, smooth and glabrous, orange when fully ripe.—*A. Rich. Fl. Nouv. Zel.* (1832) 365; *A. Cunn. Precur.* (1839) n. 638; *Raoul Choix* (1846) 50; *Bot. Mag.* (1848) t. 4379; *Hook. f. Fl. Nov. Zel.* i (1853) 49; *Handb. N.Z. Fl.* (1864) 46; *T. Kirk Forest Fl.* (1889) t. 88; *Students' Fl.* (1899) 96; *Hemsley in Ann. Bot.* 17 (1903) 752, t. 36; *Cheesem. Man. N.Z. Fl.* (1906) 104; *Ill. N.Z. Fl.* ii (1914) t. 29.

Kermadec Islands, North Island, Chatham Islands: Abundant, chiefly in lowland situations not far from the sea. South Island: Marlborough and Nelson to Banks Peninsula and Westland, but rare and local. *Karaka.* August to November

The pulpy part of the fruit is edible; but the seed is highly poisonous unless steamed, or steeped in salt water. See Mr. Colenso's valuable paper "On the Vegetable Food of the New-Zealanders" (Trans. N.Z. Inst. xiii (1881) 25), also notes by Mr. Skey and Mr. Colenso (*l.c.* iv (1872) 316). For a more recent account of the toxic qualities of the plant, reference should be made to a memoir by Professor Easterfield and Mr. B. C. Aston in Trans. N.Z. Inst. xxxiv (1902) pp. 495 and 566. Further particulars respecting the species will be found in Mr. Hemsley's memoir, quoted above, and my "Illustrations of the N.Z. Flora" (vol. i, t. 29).

Family LXI. **STACKHOUSIACEAE.**

Perennial herbs, usually of small size. Leaves alternate, narrow, quite entire, often somewhat fleshy. Stipules wanting or very minute. Flowers regular, hermaphrodite, in terminal spikes or rarely solitary. Calyx 4–5-lobed or -partite, imbricate. Petals 5, perigynous, inserted on the throat of the calyx, linear or spathulate, claws long, free at the base but more or less connate above, limb reflexed. Disc thin, clothing the base of the calyx-tube. Stamens 5, inserted on the edge of the disc. Ovary free, globose, 2–5-lobed, cells the same number; style single at the base, 2–5-lobed above; ovules 1 in each cell, erect, anatropous. Fruit of 2–5 globose angular or winged indehiscent 1-seeded cocci. Seed erect, with a membranous testa; albumen fleshy; embryo straight, radicle inferior.

A small family of 2 genera and 18 species. With the exception of the New Zealand plant and another found in the Philippine Islands, the whole of the species are confined to Australia.

STACKHOUSIA Smith. 1798.

Characters of the family as above.

1. **S. minima** *Hook. f. Fl. Nov. Zel.* i (1853) 47.—A minute slender glabrous herb, with numerous creeping often matted underground stems, and short slender erect leafy branches ½–2 in. high. Leaves crowded or distant, rather fleshy, ⅙–⅓ in. long, linear or linear-oblong or linear-obovate, flat, acute. Flowers small, yellow, solitary and terminal, almost sessile or on very short peduncles, always exceeding the leaves. Calyx-lobes short, acute. Petals usually connate at the middle to form a tubular corolla but often altogether free, linear, acute or acuminate, tips recurved. Stamens 3 long and 2 much shorter; anthers glabrous. Ovary 3-lobed; style very short, 3-cleft. Cocci obovoid, smooth, 1 or 2 ripening, seldom 3.—*Handb. N.Z. Fl.* (1864) 42; *T. Kirk Students' Fl.* (1899) 90; *Cheesem. Man. N.Z. Fl.* (1906) 97.

North Island: Auckland—Open hillsides on the Paeroa Range, near Waiotapu, *K. W. Allison!* Wellington—Saddle between Ngauruhoe and Ruapehu, *T. F. C.*; Waimarino Plains, *E. Phillips Turner! H. Carse! Cockayne.* Hawke's Bay—Open downs on the east coast, *Colenso!* Waipawa County, *H. Hill!* South Island: Nelson—Spooner's Ridge, *F. G. Gibbs!* Mount Arthur Plateau, *T. F. C.*; Wangapeka Valley, *T. F. C.*; Lake Tennyson, *R. M. Laing! T. Kirk!* Canterbury—Near Culverden, Lake Heron, Mount Arrowsmith, *Cockayne*; Ribband-wood Range, *Haast*; Broken River, *J. D. Enys!* Burnham, *T. Kirk!* Otago—Not rare, *Petrie!* Sea-level to 4000 ft. December–February. T. 71 (1941) 87

Sir Joseph Hooker describes the flowers as occurring in few-flowered spikes, and the anthers as pubescent; but I have not seen any specimens answering to this. The flowers are pleasantly fragrant, and the scent often betrays the presence of the plant long before it is seen.

Family LXII. **ICACINACEAE.**

Trees or shrubs, often climbing, rarely herbs. Leaves alternate, simple or lobed, exstipulate. Flowers regular, usually hermaphrodite, more rarely polygamous or dioecious. Calyx 4–5-toothed or -lobed. Petals 4–5, hypogynous, free or rarely united. Stamens equal in number to the petals, and alternate to them; anthers introrse. Disc rarely developed. Ovary imperfectly 2–5-celled or 1-celled by abortion; ovules 2 or rarely 1 to each cell, either attached to the apex of the cavity, or pendulous from one side of the cell. Fruit usually drupaceous, 1-celled, 1-seeded; embryo small; albumen fleshy, rarely wanting.

A small tropical or subtropical family, containing 38 genera and about 200 species, many of them very imperfectly known.

PENNANTIA Forst. 1776.

Shrubs or trees. Leaves entire or toothed. Flowers in terminal corymbose panicles or cymes, dioecious or polygamous. Calyx minute, 5-toothed. Petals 5, hypogynous, glabrous, valvate. Stamens 5, hypogynous, alternating with the petals; filaments filiform. Ovary 1-celled; stigma nearly sessile, entire or 3-lobed; ovule solitary, pendulous. Drupe small, fleshy; stone obtusely trigonous, grooved at the back to receive a flattened cord which passes through a perforation just below the apex, and bears the pendulous seed at its tip.

Besides the New Zealand species, which is endemic, there is one in Norfolk Island, and another in New South Wales.

1. **P. corymbosa** *Forst. Char. Gen.* (1776) 134.—A small slender tree 15–35 ft. high; branchlets, petioles, and inflorescence pubescent. Young stage a straggling bush with numerous spreading flexuous and interlaced slender branches; leaves distant, alternate or fascicled, cuneate, $\frac{1}{4}$–$\frac{1}{2}$ in. long or more, 3-lobed or 3–6-toothed at the tip. Leaves of mature plants shortly petioled, alternate, 1–4 in. long, obovate oblong-ovate or oblong, obtuse, sinuate or irregularly toothed or lobed, rarely entire. Flowers small, white, fragrant, dioecious. Males: Panicles and flowers larger than in the females. Filaments exceeding the petals; anthers large, oblong-sagittate, versatile, pendulous. Ovary rudimentary. Females: Filaments shorter than the petals; anthers erect. Ovary oblong; stigma 3-lobed. Drupe black, fleshy, about $\frac{1}{3}$ in. long.—*A. Rich. Fl. Nouv. Zel.* (1832) 368; *A. Cunn. Precur.* (1839) n. 576; *Raoul Choix* (1846) 50; *Hook. f. Fl. Nov. Zel.* i (1853) 35, t. 12; *Handb. N.Z. Fl.* (1864) 41; *T. Kirk Forest Fl.* (1889) tt. 77, 78; *Students' Fl.* (1899) 88; *Cheesem. Man. N.Z. Fl.* (1906) 97.

North and South Islands: From Kaitaia southwards, but local to the north of the Waikato River. Ascends to 2000 ft. *Kaikomako.* November–December.

Wood formerly used by the Maoris to obtain fire by friction; now occasionally employed for turnery, furniture, &c.

P. odorata Raoul Ann. Sci Nat. 1844. 123.

Family LXIII. **SAPINDACEAE.**

Trees, shrubs, or woody climbers, rarely herbs. Leaves alternate, rarely opposite, often compound, usually exstipulate. Flowers regular or slightly irregular, generally unisexual or polygamous. Calyx 3–5-lobed or of as many free sepals, generally imbricated. Petals 3–5 or wanting, free,

imbricati... ...sent. Stamens 5–10 ...

Sapindaceae fats

	Melting point °C	Saponification value	Iodine value
Aesculus hippocastanum (seeds)		190	57·3
Cardiospermum halicacabum (seeds)		192–214	82–89
Koelreuteria paniculata (seeds)		193	99
Litchi chinensis (Persoon Sutter)	32–36°	237–253	100–121
Nephelium lappaceum (Mexican Sutter)		192–208	77–84
Xanthoceras sorbifolia (seeds)		192	111
Blighia sapida	28–33	182	71·5
Melicoccus bijugatus	33°	242	91·4
Nephelium litchi		193	69·8
Sapindus saponaria		193	56–74
Thouinia (Alectryon) excelsum (Sutter)		214	76–3

opposite, often compound, usually exstipulate. Flowers regular or slightly irregular, generally unisexual or polygamous. Calyx 3–5-lobed or of as many free sepals, generally imbricated. Petals 3–5 or wanting, free,

imbricating. Disc variable, usually present. Stamens 5–10, rarely fewer or more, generally inserted within the disc, or rarely upon it around the rudimentary ovary. Ovary free, 2–4-lobed with as many cells; ovules 1 or more in each cell. Fruit very various, capsular or indehiscent, dry or succulent, entire or lobed, sometimes winged. Seeds globose or compressed albumen usually wanting.

A family containing 120 genera and about 1000 species, widely distributed in tropical and warm regions. Many members of the family are of economic value. Several of the most delicious of Asiatic fruits, such as the Litchi and Longan, are produced by species of *Nephelium*. The wood of the South African *Pteroxylon utile* is as hard and as handsome as Mahogany. Many species contain bitter or astringent principles, and some are poisonous. The two genera found in New Zealand have the stamens inserted outside the disc, not inside, as in most of the species.

Leaves pinnate. Disc 8-lobed. Capsule woody, turgid .. .. 1. ALECTRYON.
Leaves simple in the New Zealand species. Disc wanting. Capsule membranous, winged .. .. 2. DODONAEA.

1. **ALECTRYON** Gaertn. 1788.

A lofty tree. Leaves alternate, pinnate, exstipulate; leaflets entire or toothed. Flowers hermaphrodite or unisexual, in axillary or terminal many-flowered panicles. Calyx 4–5-lobed, villous within, lobes unequal, imbricate. Petals wanting. Disc small, 8-lobed. Stamens 5–8, inserted within the lobes of the disc; anthers large. Ovary obliquely obcordate, compressed, 1-celled; style short; stigma simple or 2–3-lobed; ovule solitary. Capsule coriaceous or almost woody, subglobose, turgid, with a flattened prominence or crest towards the top. Seed subglobose, arillate; testa crustaceous; cotyledons spirally coiled.

A genus of 2 species confined to New Zealand. According to the most recent classification, the characters of *Alectryon*, as given above, have been enlarged so as to include some 16 or 18 species formerly included in *Nephelium* and other genera. As thus reconstituted the genus will stretch from Hawaii to New Caledonia, Australia, and New Guinea.

Leaves 4–12 in. long; leaflets 4–6 pairs, 2–4 in. long, ovate-lanceolate, acuminate .. .. 1. *A. excelsum.*
Leaves 12–18 in. long; leaflets 2–3 pairs, 5–7 in. long, ovate-oblong, obtuse or subacute .. .. 2. *A. grandis.*

1. **A. excelsum** *Gaertn. Fruct.* i (1788) 216, t. 46.—A handsome tree 30–60 ft. high, with a trunk 2 ft. in diam. or more; bark black; young branches, leaves below, inflorescence, and capsules clothed with silky ferruginous pubescence. Leaves unequally pinnate, 4–12 in. long; leaflets 4–6 pairs, shortly petioled, 2–4 in. long, obliquely ovate-lanceolate, acuminate, entire or obscurely remotely toothed, membranous. Panicles 4–12 in. long, much branched. Anthers large, dark-red. Ovary pilose. Capsule $\frac{1}{3}$–$\frac{1}{2}$ in. long, opening transversely but irregularly. Seed large, almost globose, jet-black and shining, half imbedded in a bright scarlet fleshy cup-shaped aril.—*A. Cunn. Precur.* (1839) n. 598; *Hook. Ic. Plant.* (1843) t. 570; *Raoul Choix* (1846) 47; *Hook. f. Fl. Nov. Zel.* i (1853) 38; *Handb. N.Z. Fl.* (1864) 38; *T. Kirk Forest Fl.* (1889) tt. 92, 93; *Students' Fl.* (1899) 95; *Cheesem. Man. N.Z. Fl.* (1906) 103. D. C. Prodr. 1: 616, 1 A. Cunn. Ann. Nat. Hist. 3: 318.

NORTH AND SOUTH ISLANDS: North Cape to Banks Peninsula and Westland, common. Ascends to 2000 ft. *Titoki.* October–December.

Yields a tough and elastic timber, valuable for axe-handles, bullock-yokes, &c. The Maoris formerly extracted an oil from the seeds.

from Hook. Ic. Plant. t. 570.

2. **A. grandis** *Cheesem. in Trans. N.Z. Inst.* xliv (1912) 159.—A small tree 15 ft. or more in height; branchlets more or less silky with ferruginous hairs. Leaves much larger and broader than those of *A. excelsum*, 12–18 in. long; leaflets 2–3 pairs, 5–7 in. long, very shortly petioled, broadly oblong or ovate-oblong, obtuse or subacute, more or less silky-pubescent on the midrib and primary veins; ultimate veinlets conspicuously reticulated, elevated on the under-surface of the leaflet. Margins of the leaflets usually entire, but a few specimens were noted with a few coarse teeth. Flowers not seen, and only fragments of old capsules.—A. excelsum *var.* grandis *Cheesem. Man. N.Z. Fl.* (1906) 103.

THREE KINGS ISLANDS: Cliffs on the north side, a single small clump alone seen, *T. F. C.* (November, 1889).

It is much to be regretted that no further specimens have been obtained of this fine plant since its discovery 32 years ago. It can be distinguished from *A. excelsum* without the slightest difficulty by the smaller number of leaflets to each leaf, and by their shape and much greater size. In *A. excelsum* the leaflets are 2–4 in. long, and ovate-lanceolate in shape; whereas in *A. grandis* they are 5–7 in. long, and are broadly oblong or ovate-oblong. They are also firmer in texture, and much more obtuse.

2. **DODONAEA** Linn.

Shrubs or small trees, often viscid with a resinous exudation. Leaves alternate, exstipulate. Flowers unisexual or polygamous, in terminal or axillary racemes or panicles, rarely solitary. Sepals 2–5, imbricate or valvate. Petals wanting. Stamens 5–10, usually 8; filaments short; anthers linear-oblong. Ovary 3–6-celled, with 2 ovules in each cell. Capsule membranous or coriaceous, 2–6-sided, septicidally 2–6-valved; valves winged at the back. Seeds 1–2 in each cell, lenticular or subglobose, compressed, with a thickened funicle but not arillate; embryo spirally coiled.

A genus comprising about 50 species, fully 40 of which are confined to Australia, the remainder scattered through the tropical or subtropical regions of both hemispheres. The New Zealand species is found in most warm countries.

1. **D. viscosa** *Jacq. Enum. Pl. Carib.* (1760) 19.—Usually a glabrous shrub or small tree 8–20 ft. high, but occasionally dwarfed to 1–3 ft., and sometimes attaining 30–35 ft.; trunk seldom more than 12 in. diam.; young branches usually compressed or triangular, viscid. Leaves 1–3 in. long, narrow linear-obovate or oblanceolate, obtuse, rarely acute, entire, gradually narrowed into a short petiole. Flowers small, greenish or reddish, in few-flowered terminal panicles, dioecious. Male flowers: Sepals 4, free, oblong or ovate. Stamens 8–10, rather longer than the sepals; filaments very short. Females: Sepals narrower, more erect. Style stout, 2-fid, long-exserted. Capsule $\frac{3}{4}$ in. diam., compressed, orbicular, very broadly 2–3-winged, 2-lobed at each end; wings veined, membranous.—*Hook. f. Fl. Nov. Zel.* i (1853) 38; *Handb. N.Z. Fl.* (1864) 45; *T. Kirk Forest Fl.* (1889) t. 15; *Students' Fl.* (1899) 94; *Cheesem. Man. N.Z. Fl.* (1906) 102. D. spathulata *Smith in Rees Cyclop.* xii (1819) n. 2; *A. Rich. Fl. Nouv. Zel.* (1832) 308; *A. Cunn. Precur.* (1839) n. 599; *Raoul Choix* (1846) 47.

NORTH AND SOUTH ISLANDS. From the North Cape as far south as Banks Peninsula and Greymouth, chiefly in lowland districts. *Akeake.* September–November.

Wood hard and heavy; formerly much used by the Maoris for making clubs, spears, &c.

C O P Y

Cann River,
Via Orbost,
Victoria,
Australia.

7.2.1950

Dr. H. H. Allan.

Dear Sir,

Mr. Cooper has informed me when writing recently that you have in hand the preparation of a third edition of the Manual of N.Z. Flora. In case you are dealing with the Rhamnaceae before my intended publication of a monograph on the genus Pomaderris, I shall outline for your information the New Zealand species of the genus as I have found them:

P. apetala Lab. Pl. Nov.-Holl. 1, 62, t.87 (1806)
Syn. P. mollis Colenso, Trans. N.Z. Inst. XXV, 327 (1893).
Distribution: N.S. Wales, Vic., Tas., S. Aust. & N.Zeal.

P. phylicifolia Lodd. ex Link Enum. Hort. Berol. 1, 232 (1821).
Syn. P. amoena Colenso, Trans. N.Z. Inst. XXll, 258 (1886)
The type form of the species is confined toNew South Wales, and the N.Z. form, which occurs also in Tasmania, was described from the latter locality as P. ericifolia Hook. (Journ. Bot. 1, 257, 1834). There are other Australian variants, and the species ranges from N.S.Wales through Vic. to Tas. & N.Zeal.

P. racemosa Hook. Journ. Bot. 1, 256 (1834).
(Syn. P. rugosa Cheeseman, Trans. N.Z. Inst., 54, 566 (1923)).
The N.Zealand material varies very little from the type form, and in Australia there are various other variants which have been set up as species from time to time. The range of the species is: N.S. Wales, Vic., Tas., S.Aust., W.Aust. & N.Zeal.

P. prunifolia A.Cunn. ex. Fenzl. in Hueg. Enum. 22 (1837).
(Syn. P. Edgerleyi Hook.f. Hand. N.Zeal. Flora 43).
The N.Zeal. plant is not distinguishable from the type form from Bathurst, N.S.Wales. Also in Victoria.

P. Kumeraho A.Cunn.Ann. Nat. Hist. Ser. 1. Vol.111, 248 (1839).
This is the only N.Zeal. endemic in the genus, and it is distinguished from P. elliptica Lab. (a Tasmanian endemic) by the much longer vestiture, the more corymbose inflorescence, etc. (Five other Australian species have been lumped also at times with P. elliptica).

I have seen also one doubtful specimen, from the Bay of Islands, resembling the Australian P. multiflora Sieb. ex Fenzl, but it may be an unusual development of P. Kumeraho.

Yours faithfully,

(Sgd.) N. A. WAKEFIELD

Family LXIV. **RHAMNACEAE.**

Trees, shrubs, or woody climbers; branches sometimes spinescent. Leaves simple, alternate, rarely opposite, entire or toothed. Stipules small, often caducous, sometimes metamorphosed into thorns. Flowers regular, hermaphrodite or unisexual, small and inconspicuous, usually arranged in axillary or terminal cymes or panicles. Calyx 4–5-cleft, valvate. Petals 4–5, rarely wanting, inserted on the throat of the calyx-tube, small, usually hood-shaped or involute. Stamens 4–5, perigynous, inserted with the petals and opposite to them; filaments short; anthers often concealed within the involute tips of the petals. Disc perigynous, adnate to the calyx, of very various shape. Ovary free or immersed in the disc, altogether superior or more or less adnate to the calyx-tube, 3-celled, rarely 2- or 4-celled; style short; ovules solitary in each cell, erect, anatropous. Fruit free or girt by the persistent calyx-tube, drupaceous or capsular, 1–4-celled. Seed solitary, erect, sometimes arillate; albumen fleshy, rarely wanting; embryo large, erect, radicle inferior.

A well-marked family, distributed over most parts of the world. Genera about 40; species under 500. The jujube (*Zizyphus*) produces a wholesome and agreeable fruit, but as a rule most of the species possess bitter or astringent properties, and some are purgative. The 2 genera found in New Zealand both extend to Australia, and 1 of them (*Discaria*) is found in South America as well.

Tomentose, unarmed. Leaves alternate. Ovary inferior .. 1. POMADERRIS.

Glabrous, spiny. Leaves opposite or wanting. Ovary superior .. 2. DISCARIA.

1. **POMADERRIS** Labill. 1804.

Shrubs, more or less covered with hoary or ferruginous stellate tomentum. Leaves alternate. Flowers pedicellate, in small cymes usually forming terminal or axillary corymbs or panicles. Calyx-tube adnate to the ovary, limb 5-toothed to the base, deciduous or reflexed. Petals 5 or wanting. Stamens 5; filaments longer than the petals; anthers oblong. Disc inconspicuous, surrounding the top of the ovary at the base of the calyx-lobes. Ovary more or less inferior; style 3-fid. Capsule small, upper part protruding above the calyx-tube, 3-valved; endocarp separating into 3 cocci, which either split down the inner face or open by an oblong lid. Seed on a thickened funicle.

A genus of about 22 species, restricted to Australia, New Caledonia, and New Zealand. Three of the New Zealand species are also found in Australia; the remaining 2 are endemic.

* Flowers with petals.

Leaves 2–3 in., elliptic-oblong, obtuse, entire .. .. 1. *P. elliptica.*

** Flowers without petals.

Leaves 2–4 in., oblong-ovate, crenulate; tomentum white or grey 2. *P. apetala.*
Leaves elliptic-lanceolate, $\frac{1}{3}$–$1\frac{1}{2}$ in., subacute, glabrous above .. 3. *P. rugosa.*
Leaves oblong, obtuse, bristly above .. .. .. 4. *P. Edgerleyi.*
Leaves small, linear or oblong, $\frac{1}{8}$–$\frac{1}{4}$ in., margins revolute to the midrib .. .. 5. *P. phylicaefolia.*

1. **P. elliptica** *Lab. Nov. Holl. Pl.* i (1804) 61, t. 86.—A sparingly branched shrub 4–8 ft. high; young branches, petioles, leaves beneath, and inflorescence densely clothed with fine white or buff stellate tomentum. Leaves shortly petiolate, 2–3 in. long, elliptic-oblong or ovate-oblong, obtuse

or acute, quite entire, glabrous above, veins and midrib prominent beneath. Cymes numerous, terminal, forming large much-branched corymbose panicles. Flowers bright-yellow, $\frac{1}{5}$–$\frac{1}{4}$ in. diam. Calyx covered with stellate tomentum mixed with long silky hairs. Petals with a broad blade with crisped margins and a long slender claw. Capsule small, the free portion shorter than the calyx-tube. Cocci opening by an oblong lid on the inner face.—*Bot. Mag.* t. 1510; *Hook. f. Fl. Nov. Zel.* i (1853) 46; *Handb. N.Z. Fl.* (1864) 43; *Benth. Fl. Austral.* i (1863) 417; *T. Kirk Students' Fl.* (1899) 91; *Cheesem. Man. N.Z. Fl.* (1906) 99. P. Kumeraho *A. Cunn. Precur.* (1839) n. 577; *Raoul Choix* (1846) 50.

North Island: Auckland—On open clay hills from the North Cape to Pirongia Mountain and Kawhia Harbour on the west coast, and to Tauranga Harbour on the east coast. *Kumerahou.* September–October. Also in south-east Australia and Tasmania. The bright-yellow flowers render this a very ornamental plant when in bloom.

2. **P. apetala** *Lab. Nov. Holl. Pl.* i (1804) 52, t. 87.—A shrub or small tree 6–15 ft. high, rarely more; branchlets, under-surface of leaves, and inflorescence covered with dense white or greyish stellate tomentum. Leaves petiolate, 2–4 in. long, oblong-ovate or oblong-lanceolate, obtuse or subacute, irregularly crenulate, glabrous and wrinkled above, veins prominent below. Flowers small, numerous, in terminal and axillary panicles 3–7 in. long. Calyx-tube short, clothed with stellate hairs. Petals wanting. Anthers tipped by a minute gland. Style 3-fid to the middle. Capsule obtuse, sparsely covered with stellate hairs. Cocci opening by a valve on the inner face.—*Benth. Fl. Austral.* i (1863) 419; *T. Kirk Forest Fl.* (1889) t. 8; *Students' Fl.* (1899) 92; *Cheesem. Man. N.Z. Fl.* (1906) 99. P. tainui *Hector in Trans. N.Z. Inst.* xi (1879) 429. P. mollis *Col. in Trans. N.Z. Inst.* xxv (1893) 327.

North Island: Formerly abundant at Kawhia, but now extinct; between Kawhia and Mokau, *Gilbert;* between the Mokau and Mohakatino Rivers, *Hector! T. Kirk!* Chatham Islands: *F. A. D. Cox.* Also naturalized in Hawke's Bay, and at Geraldine, Canterbury. *Tainui.* October–November.

A common Australian plant. The Maoris assert that it sprang from the rollers or skids that were brought in the canoe "Tainui" when they first colonized New Zealand.

3. **P. rugosa** *Cheesem. n. sp.*—An erect branching shrub 4–8 ft. high or more; bark dark-brown or dark purplish-brown; branchlets villous with stellate or simple hairs. Leaves elliptic-lanceolate or oblong-lanceolate, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, obtuse or subacute, much wrinkled and glabrous above with the veins deeply impressed; the veins prominent beneath and densely clothed with ferruginous stellate hairs, the interspaces between the veins covered with longer and paler simple hairs mixed with a few stellate ones. Flowers very numerous, in terminal and axillary cymes, small, $\frac{1}{10}$ in. diam. Petals wanting. Calyx-tube densely hoary with flexuous silky hairs. Styles divided nearly to the base. Ripe cocci not seen.—P. Edgerleyi *Cheesem. Man. N.Z. Fl.* (1906) 100 (*in part*); *Ill. N.Z. Fl.* i (1914) t. 28 (*not of Hook. f.*).

North Island: Whangarei Heads, summit of Mount Manaia, *T. Kirk! T. F. C.*, Cape Colville and Coromandel to Tapu Creek (Hastings); upper part of the Kauaeranga Valley, Thames, *T. F. C., Adams! W. Townson!* Mercury Bay, *T. Kirk!*

So far this has been confused with *P. Edgerleyi*, from which, however, it can be readily distinguished by its taller and more fastigiate habit, and by the longer and narrower leaves, which are quite glabrous on the upper surface, whereas those of the true *P. Edgerleyi* have the upper surface densely covered with short stiff bristles. As Hooker specially mentions the "scabrid" leaves in his description of Edgerley's plant (see Fl. Nov. Zel. i (1853) 46) there can be no question as to its identity.

4. **P. Edgerleyi** *Hook. f. Handb. N.Z. Fl.* (1864) ~~106~~ 443.—A small straggling or procumbent shrub, 2–4 ft. high, rarely more. Branchlets, under-surface of leaves, petioles, and inflorescence densely clothed with loose ferruginous stellate tomentum. Leaves shortly petioled, $\frac{1}{2}$–1 in. long, obtuse at both ends, oblong or broadly oblong; upper surface conspicuously scabrid with short and stiff bristly hairs. Flowers (not seen quite expanded) in terminal and axillary cymes; apparently very similar to those of *P. rugosa*. Ripe cocci not seen.—*T. Kirk Students' Fl.* (1899) 91 (*in part*); *Cheesem. Man. N.Z. Fl.* (1906) 100 (*in part*). Pomaderris (?) *sp. Hook. f. Fl. Nov. Zel.* i (1853) 46.

North Island: Hills between Parengarenga Harbour and Spirits Bay and the North Cape, *T. Kirk! T. F. C.*; hills flanking the sea-coast from Aratapu to Dargaville, abundant, *T. F. C., Colonel Boscawen!* near Waipu, *T. Kirk*; inland from Whangarei, *Edgerley*. Sea-level to 500 ft. November–December.

In my account of the preceding species (*P. rugosa*) I have pointed out the differences between the two plants, which appear to me to be sufficiently ample to justify their separation.

5. **P. phylicaefolia** *Lodd. Bot. Cab.* (1818) t. 120.—A small heath-like shrub 1–4 ft. high; branches densely villous, spreading or erect, fastigiate. Leaves small, of very young plants $\frac{1}{2}$–$\frac{3}{4}$ in. long, oblong or ovate, obtuse, flat, hairy on both surfaces; of older plants $\frac{1}{6}$–$\frac{1}{3}$ in. long, nearly sessile, spreading, linear or linear-oblong, grooved down the middle and scabrid with short white hairs above, margins revolute to the midrib, concealing nearly the whole of the villous under-surface. Flowers minute, in small axillary cymes slightly longer than the leaves, very abundantly produced. Calyx small, densely pubescent, lobes spreading. Petals wanting. Capsule ovoid, hirsute; cocci opening along the whole length of the inner face.—*Benth. Fl. Austral.* i (1863) 422; *Hook. f. Handb. N.Z. Fl.* (1864) 43; *T. Kirk Students' Fl.* (1899) 92; *Cheesem. Man. N.Z. Fl.* (1906) 100. P. ericifolia *Hook. in Lond. Journ. Bot.* i (1834) 257; *A. Cunn. Precur.* (1839) n. 578; *Raoul Choix* (1846) 50; *Hook. f. Fl. Nov. Zel.* i (1853) 46. P. amoena *Col. in Trans. N.Z. Inst.* xvii (1885) 258. T. 57 (1926) 72.

North Island: North Cape to Otaki and Cape Palliser, plentiful in open country, ascending to over 2000 ft. *Tauhinu*. November–December. Also found in Victoria and Tasmania.

2. DISCARIA Hook. 1830.

Much-branched rigid shrubs or small trees, with opposite often spinous branchlets. Leaves opposite or fascicled, sometimes wanting. Flowers axillary. Calyx membranous, free or adnate to the ovary at the base; limb campanulate, 4–5-lobed. Petals 4–5, hooded, often wanting. Stamens 4–5; filaments short. Disc adnate to the base of the calyx-tube, annular. Ovary more or less sunk in the disc, 3-lobed, 3-celled; style slender; stigma 3-lobed. Drupe (or capsule) dry, coriaceous, 3-lobed, endocarp separating into 3 2-valved crustaceous cocci. Seeds with a coriaceous testa.

Species about 16, mostly natives of extra-tropical and alpine South America, with 1 species in Australia and another in New Zealand.

1. **D. Toumatou** *Raoul Choix* (1846) 29, t. 29.—A much-branched thorny bush or small tree 2–15 ft. high or even more, glabrous or slightly puberulous. Branches divaricating, flexuous; young ones green, terete; branchlets reduced to opposite distichous or decussate rigid spines 1½–2 in. long. Leaves often wanting, fascicled below the axils of the spines or opposite on short shoots, ½–¾ in. long, linear-obovate or oblong-obovate, obtuse. Flowers small, ⅙ in. diam., greenish-white, fascicled with the leaves below the axils of the spines; pedicels short, puberulous. Calyx-lobes 4–5, reflexed. Petals wanting. Capsule ⅕ in. diam., globose, deeply 3-lobed.—*Hook. f. Handb. N.Z. Fl.* (1864) 44; *T. Kirk Forest Fl.* (1889) t. 136; *Students' Fl.* (1899) 93; *Cheesem. Man. N.Z. Fl.* (1906) 101. D. australis *Hook. var.* apetala *Hook. f. Fl. Nov. Zel.* i (1853) 47. Notophoena Toumatou *Miers in Ann. and Mag. Nat. Hist.* Ser. iii, 5 (1860) 271. N.Z. J. Sci T - 5 - 1922 : 286. T. 57 (1927) 53.

North Island: Sand-dunes north of the Waikato River, southwards to Cook Strait, and in various localities in the interior, not common. South Island: Common on the eastern side of the Southern Alps, and forming a large part of the vegetation of the mountain-valleys; much rarer on the western side of the Island. Sea-level to 3500 ft. *Tumatu-kuru.* November–January.

Can only be distinguished from the Australian and Tasmanian *D. australis* by the absence of petals. It attains a large size in the cool mountain-valleys of the South Island, but near the coast is usually low and scrubby.

Tiliaceæ.

Family LXV. ELAEOCARPACEAE.

Trees or shrubs. Leaves alternate or subopposite, usually exstipulate, entire or toothed or lobed. Flowers hermaphrodite or frequently polygamous, arranged in racemes or panicles, sometimes few together or solitary. Sepals 4–5, free or united, valvate. Petals 4–5 or absent, sometimes sepaloid, often incised at the tip, valvate or imbricate, frequently pubescent. Stamens numerous, rarely few, inserted on the disc, anthers 2-celled, opening by two short slits or pores at the apex. Ovary 2–5-celled, with 2 or more ovules in each cell. Fruit a capsule or drupe; seeds few in each cell or several; embryo straight; albumen copious.

As limited above, this is a small family containing 7 or 8 genera and 120 species, most of which are tropical or subtropical. The two New Zealand genera have wide ranges. *Elaeocarpus* stretches northwards to the Sandwich Islands, Australia, Malaya, and India, and has an outlying species in Japan; while *Aristotelia* occurs in South America, Australia, and Tasmania, and has been reported from the New Hebrides and New Guinea.

Leaves alternate.	Fruit a drupe	1. Elaeocarpus.
Leaves opposite.	Fruit a berry	2. Aristotelia.

1. ELAEOCARPUS Linn. Linn. 1747.

Trees. Leaves usually alternate, entire or serrate, exstipulate. Flowers hermaphrodite, rarely polygamous, in axillary racemes. Sepals 4 or 5, distinct, valvate. Petals the same number, laciniate at the apex, inserted round a cushion-shaped torus. Stamens numerous, seated on the torus; anthers long, awned, opening by a terminal slit. Ovary 2–5-celled; ovules 2 or more in each cell, pendulous; style subulate; stigma terminal, simple. Fruit a drupe with a hard or bony stone, which is 2–5-celled or by abortion 1-celled. Seeds solitary in each cell, pendulous; albumen fleshy; cotyledons broad.

A large genus, containing about 70 species. Most plentiful in the hotter parts of India and the Malay Archipelago, a few species only extending to Australia, the Pacific islands, and New Zealand. Both our species are endemic.

Branchlets silky. Leaves linear-obovate, margins recurved .. 1. *E. dentatus.*
Branchlets glabrous. Leaves linear-oblong or lanceolate, margins flat .. .. 2. *E. Hookerianus.*

1. **E. dentatus** *Vahl. Symb. Bot.* iii (1790–94) 66.—A round-headed tree 40–60 ft. in height; trunk slender, straight, 1–3 ft. diam.; branchlets often bare of leaves except at the tips, silky when young. Leaves erect, on short stout petioles ½–1 in. long; blade 2–4 in., linear-oblong obovate-oblong or obovate-lanceolate, narrowed below, obtuse or shortly acuminate, coriaceous, obscurely sinuate-serrate, often white with fine appressed silky hairs beneath; margins recurved. Racemes numerous, 8–12-flowered, silky, usually shorter than the leaves. Flowers drooping, ⅓–½ in. diam., white. Petals obovate-cuneate, lacerate. Stamens 10–20; filaments very short; anthers linear, with a flat recurved tip. Ovary silky, 2-celled. Drupe about ½ in. long, oblong or ovoid, purplish-grey; stone rugose, 1-celled, 1-seeded.—*Hook. f. Handb. N.Z. Fl.* (1864) 34; *T. Kirk Forest Fl.* (1889) t. 11; *Students' Fl.* (1899) 76; *Cheesem. Man. N.Z. Fl.* (1906) 85; *Ill. N.Z. Fl.* i (1914) t. 24. E. Hinau *A. Cunn. Precur.* (1839) n. 602; *Hook. Ic. Plant.* (1844) t. 602; *Hook. f. Fl. Nov. Zel.* i (1853) 32. E. Cunninghamii *Raoul Choix* (1846) 25. Dicera dentata *Forst. Char. Gen.* (1776) 80. Erjostemon dentatus *Colla. Hort. Ripul.* (1824) 52, t. 30.

Var. **obovatus** *Cheesem. in Trans. N.Z. Inst.* xxxix (1907) 442.—Leaves broadly obovate; blade 2–2½ in. long by 1¼–2 in. broad, rounded at the apex, at the base rather suddenly narrowed into a long slender petiole. Flowers not seen. Riwaka (Nelson), *H. J. Matthews!*

North and South Islands: Not uncommon in lowland forests from the North Cape to Catlin's River, Otago. Altitudinal range from sea-level to 2000 ft. *Hinau.* October–November.

The fruit was formely eaten by the Maoris, the pulpy part being rubbed off the stone, steeped in water, and then made into large cakes, which were baked for a day or two. They also obtained a black dye from the bark, which was used for dyeing their flax cloaks, and is still employed for that purpose by a few of the inland tribes. The wood is durable, but is little employed, although a figured variety is now coming into use for panelling and furniture.

2. **E. Hookerianus** *Raoul Choix* (1846) 26, t. 25.—A small glabrous tree 20–40 ft. high, with a trunk 1–3 ft. diam.; bark pale. Young plants with numerous tortuous and interlaced branches, which bear narrow-linear leaves ½–2 in. long, sinuate or irregularly toothed or lobed or almost pinnatifid, occasionally broadly obovate or almost orbicular. Leaves of mature plants 1½–3 in. long, elliptical or linear-oblong or lanceolate, coriaceous, obtuse, sinuate-crenate or serrate; margins flat; petioles short, ¼–½ in. long. Racemes slender, spreading, shorter than the leaves. Flowers greenish-white, small, drooping. Sepals lanceolate. Petals slightly longer than the sepals, 4–5-lobed at the tip. Drupe similar to that of *E. dentatus*, but smaller, ⅓ in. long.—*Hook. f. Fl. Nov. Zel.* i (1853) 32; *Handb. N.Z. Fl.* (1864) 34; *T. Kirk Forest Fl.* (1889) tt. 12, 13; *Students' Fl.* (1899) 76; *Cheesem. Man. N.Z. Fl.* (1906) 85.

North and South Islands, Stewart Island: Forests from Mangonui and Kaitaia southwards, but exceedingly local north of the Auckland Isthmus. Altitudinal range from sea-level to 3000 ft. *Pokaka.* November–January.

The variability of the leaves in young plants is most remarkable. As the young tree grows up it is not uncommon to find on the lower branches a curious mixture of linear, obovate, or almost orbicular leaves, which may be nearly entire or deeply lobulate; while on the upper branches the leaves have already assumed the shape of the mature stage.

2. **ARISTOTELIA** L'Herit. 1784. Kew Bull. 1940 p. 172.

Shrubs or trees. Leaves opposite or nearly so, entire or toothed, exstipulate. Flowers small, unisexual, axillary or lateral, racemose or rarely solitary. Sepals 4–5, valvate. Petals the same number, 3-lobed, toothed or entire, inserted round the base of the thickened torus. Stamens numerous or 4–5, inserted on the torus. Ovary 2–4-celled; ovules 2 in each cell; styles subulate. Fruit a berry. Seeds ascending or pendulous, often pulpy on the outside of the hard testa.

A small genus of 9 or 10 species, 4 of which are found in Australia, 1 in the New Hebrides, 2 in South America, and the 3 following in New Zealand.

Leaves large, membranous. Racemes panicled, many-flowered .. 1. *A. racemosa.*
Leaves large, not so membranous as the preceding. Racemes simple or only slightly compound .. .. 2. *A. Colensoi.*
Leaves small, coriaceous. Flowers few together or solitary .. 3. *A. fruticosa.*

1. **A. racemosa** *Hook. f. Fl. Nov. Zel.* i (1853) 33.—A small graceful tree 8–25 ft. high; bark of young branches red, becoming darker with age; branchlets, young leaves, petioles, and inflorescence pubescent. Leaves opposite or nearly so, 2–5 in. long, ovate or ovate-cordate, acuminate, thin and membranous, deeply and irregularly acutely serrate, often reddish beneath; petioles long and slender. Flowers small, $\frac{1}{6}$ in. diam., rose-coloured, in many-flowered axillary panicles, dioecious; the males rather larger than the females; pedicels slender. Petals 4, 3-lobed at the tip, smaller in the female flowers. Stamens numerous, minutely hairy; anthers longer than the filaments. Female flowers: Ovary 3–4-celled; styles the same number. Fruit a 3–4-celled berry about the size of a pea, dark-red or almost black. Seeds usually about 8, angular.—*Handb. N.Z. Fl.* (1864) 33; *T. Kirk Forest Fl.* (1889) t. 113; *Students' Fl.* (1899) 75; *Cheesem. Man. N.Z. Fl.* (1906) 83; *Ill. N.Z. Fl.* i (1914) t. 23. Friesia racemosa *A. Cunn. Precur.* (1839) n. 603; *Raoul Choix* (1846) 48; *Hook Ic. Plant.* (1844) t. 601. 1776: 40

Tracocarpus dicera Murray S.V. 94.

North and South Islands, Stewart Island: Common in lowland forests throughout, ascending to nearly 3500 ft. *Makomako; Wineberry.* September–November.

An abundant and well-known plant, usually the first to appear after the forest has been cut down. The wood is largely employed for making charcoal for the manufacture of gunpowder.

T. 59 (1929) 725.

2. **A. Colensoi** *Hook. f. Handb. N.Z. Fl.* (1864) 33.—A shrub or small tree 6–15 ft. high, very similar in general appearance to *A. racemosa*, but the leaves are firmer in texture, sometimes narrower and ovate-lanceolate, usually quite glabrous, green below. Racemes simple, rarely compound, few-flowered. Berry smaller, the size of a peppercorn.—*T. Kirk Students' Fl.* (1899) 84; *Cheesem. Man. N.Z. Fl.* (1906) 84.

North Island: Western base of Ruapehu, *T. F. C.*; Ruahine and Kaimanawa Mountains, *B. C. Aston*; Mount Holdsworth, *Cockayne*; Tararua Mountains, *Petrie, B. C. Aston!* Wairarapa Valley, *Colenso!* South Island: Subalpine forests from

Dicera? serrata Forst. Prodr. n. 227.
D.C. Prodr. 1, p. 520, A. Rich. Fl. Nov. Zel. p. 304.
Elaeocarpus dicera, Vahl., Symb. 3. p. 67.
Ignon Hook. Ic. Plant. t. 601.

Nelson to Otago, not uncommon. STEWART ISLAND: Rakiahua River, *Cockayne.* Usually from 1500 to 4500 ft., but descends almost to sea-level in Foveaux Strait and Stewart Island.

A puzzling plant. There is an unnamed specimen of old date in Mr. Colenso's herbarium which agrees perfectly with Hooker's description; but all the South Island specimens that I have seen have broader and less acuminate leaves. Probably all are nothing more than forms of *A. racemosa.*

3. **A. fruticosa** *Hook. f. Fl. Nov. Zel.* i (1853) 34.—A very variable much-branched erect or decumbent shrub 3–8 ft. high; branches often close and rigid; bark red-brown; branchlets, petioles, and pedicels pubescent. Leaves excessively variable, of young plants linear or lanceolate, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, acute or acuminate, toothed lobed or pinnatifid; on mature plants $\frac{1}{4}$–1 in. long, ovate-obovate or oblong-obovate or linear-oblong, obtuse, coriaceous, entire crenate serrate or shortly lobed; petioles short, stout. Flowers small, axillary, solitary or in 3–6-flowered racemes or cymes; pedicels short, pubescent. Sepals 4, oblong, obtuse, pubescent. Petals 4, shorter or longer than the sepals, entire or with 1–4 irregular shallow notches at the apex. Stamens 4–6; filaments very short. Berry very small, globose. Seeds usually 4.—*Handb. N.Z. Fl.* (1864) 33; *T. Kirk Students' Fl.* (1899) 75; *Cheesem. Man. N.Z. Fl.* (1906) 84. A. erecta *Buch. in Trans. N.Z. Inst.* iii (1871) 209. Myrsine brachyclada *Col. in Trans. N.Z. Inst.* xxii (1890) 478.

Family LXVI. **TILIACEAE.**

Trees or shrubs, rarely herbs. Leaves alternate, seldom opposite, simple, entire or toothed or lobed. Stipules present. Flowers regular, usually hermaphrodite, axillary or terminal, generally cymose. Sepals 4–5, free or connate, valvate. Petals 4–5, seldom fewer, rarely wanting, sometimes glandular at the base. Stamens usually numerous, free or united in groups, usually inserted on the disc; anthers 2-celled. Ovary free, 2–10-celled; style simple or divided into as many lobes or stigmas as there are cells to the ovary; ovules few or many, attached to the inner angle of the cell. Fruit dry or fleshy, dehiscent or indehiscent, 2–10-celled or by abortion 1-celled. Seeds solitary, or many; albumen copious, fleshy; embryo straight.

A family comprising 35 genera and about 320 species, chiefly tropical and subtropical. One well-known genus (*Tilia*) is found in the North Temperate Zone, and several are endemic in southern latitudes or extend thereto. The most important plant is *Corchorus capsularis*, which yields the fibre known as jute. All the species are innocuous. The single New Zealand genus is endemic, but it is closely allied to the South African *Sparrmannia.*

The variability of the leaves in young plants is most remarkable. As the young tree grows up it is not uncommon to find on the lower branches a curious mixture of linear, obovate, or almost orbicular leaves, which may be nearly entire or deeply lobulate; while on the upper branches the leaves have already assumed the shape of the mature stage.

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A small genus of 9 or 10 species, 4 of which are found in Australia, 1 in the New Hebrides, 2 in South America, and the 3 following in New Zealand.

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Aristotelia serrata (Forst.) Oliv. =

(A. racemosa. A. Cunn.)

T.N.Z.I. vol. 53, p. 365.

Man. N.Z. Fl. (1906) 83; *Ill. N.Z. Fl.* 1 (1914) t. 23. Friesia racemosa *A. Cunn. Precur.* (1839) n. 603; *Raoul Choix* (1846) 48; *Hook Ic. Plant.* (1844) t. 601. 1776: 140

Tra coccarpus dicera Wineberry S.V. 94.

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NORTH AND SOUTH ISLANDS, STEWART ISLAND: Mountainous districts from the Thames southwards, but rare north of the East Cape. Ascends to 4500 ft.

One of the most variable plants in New Zealand. There seem to be two well-marked forms—one with an erect and comparatively open habit of growth, larger leaves, and 4–6-flowered racemes, answering to the *A. erecta* of Buchanan; the other is often decumbent, with rigid and interlaced often tortuous branches, smaller leaves, and frequently solitary flowers.

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A family comprising 35 genera and about 320 species, chiefly tropical and subtropical. One well-known genus (*Tilia*) is found in the North Temperate Zone, and several are endemic in southern latitudes or extend thereto. The most important plant is *Corchorus capsularis*, which yields the fibre known as jute. All the species are innocuous. The single New Zealand genus is endemic, but it is closely allied to the South African *Sparrmannia*.

ENTELEA R. Br. 1824,

A shrub or small tree. Leaves large, alternate, cordate, 5–7-nerved, toothed or crenate. Flowers in terminal umbelliform cymes, large, white, bracteate. Sepals 4–5, free. Petals the same number, crumpled. Stamens numerous, all fertile, free; anthers versatile. Ovary 4–6-celled; style simple; stigma terminal, denticulate or fringed; ovules numerous in each cell. Capsule globose, covered with long rigid bristles, loculicidally 4–6-valved. Seeds numerous, obovoid; testa coriaceous; albumen oily.

The genus consists of a single endemic species.

1. **E. arborescens** *R. Br. in Bot. Mag.* (1824) t. 2480.—A handsome shrub or small tree 8–20 ft. high, with a trunk 5–9 in. diam.; wood exceedingly light. Young branches, leaves, petioles, and inflorescence covered with short soft stellate hairs. Leaves alternate, large, on petioles 4–8 in. long; blade 4–9 in. or more, obliquely rounded-ovate, cordate at the base, acuminate, irregularly doubly crenate-serrate, often obscurely 3-lobed, 5–7-nerved from the base; stipules persistent. Flowers very abundant, in erect terminal or axillary cymes, white, 1 in. diam. Sepals acuminate. Ovary hispid. Capsule 1 in. diam., globose, echinate with long rigid bristles.—*A. Cunn. Precur.* (1839) n. 601; *Raoul Choix* (1846) 48; *Hook. f. Fl. Nov. Zel.* i (1853) 31; *Handb. N.Z. Fl.* (1864) 32; *T. Kirk Forest Fl.* (1889) t. 33; *Students' Fl.* (1899) 74; *Cheesem. Man. N.Z. Fl.* (1906) 82; *Ill. N.Z. Fl.* i (1914) t. 22. Apeiba australis *A. Rich. Fl. Nouv. Zel.* (1832) 301, t. 34. T. 71(1941)67.

North Island: Not uncommon along the shores from the Three Kings Islands and the North Cape to Tairua and Raglan, rare and local further south. East Cape district, *Banks* and *Solander! Adams;* Hawke's Bay, *Colenso!* Cape Palliser and Paekakariki, *T. Kirk;* Urenui (Taranaki), *T. F. C.* South Island: Nelson—Islands near Cape Farewell, *Kingsley;* near Collingwood, *Hector;* Fisherman's Island, near Motueka, *F. G. Gibbs!* Marlborough—Resolution Bay, Queen Charlotte Sound, *J. H. Macmahon! Whau; Hauma.* October–January.

Greedily eaten by cattle and horses, and consequently fast becoming rare on the mainland, except in comparatively inaccessible situations. It is still plentiful on most of the small outlying islands on the north-east coast of the Auckland District, often exhibiting great luxuriance. On Cuvier Island I measured leaves with petioles 2 ft. long, with a blade 1 ft. 6 in. diam. The wood is extremely light, the specific gravity being much less than that of cork. It is frequently used by the Maoris for the floats of fishing-nets.

Family LXVII. MALVACEAE.

Herbs, shrubs, or soft-wooded trees, usually with tough fibrous inner bark, young parts frequently clothed with stellate hairs. Leaves stipulate, alternate, often palmately veined, entire or lobed or rarely compound. Flowers regular, hermaphrodite or rarely unisexual, often furnished at the base with a kind of involucel composed of few or many free or connate bractlets. Sepals 5, valvate, more or less united into a lobed or entire calyx, persistent. Petals 5, hypogynous, contorted in the bud. Stamens many, hypogynous; filaments united into a tube surrounding the pistil usually called the staminal column; anthers reniform, 1-celled. Ovary 2–many-celled, of 2 to many carpels whorled round a common axis; carpels either distinct or united; ovules 1 or more to each carpel, attached

to the inner angle. Fruit either of dry indehiscent or dehiscent cocci, or a capsule with loculicidal dehiscence. Seeds reniform or obovoid; albumen scanty or wanting; embryo often curved, cotyledons broad, foliaceous.

A large tropical and subtropical family, less common in temperate regions, and not extending either far north or south. Genera about 37; species about 700. Most of the species possess mucilaginous properties, and all are quite innocuous. Many are cultivated for ornament, and one genus (*Gossypium*) for the woolly covering which surrounds its seeds, and which constitutes the cotton of commerce. Of the 4 following genera, *Hoheria* is endemic; *Plagianthus* is found in Australia, and *Gaya* in South America; while *Hibiscus* is universal in warm countries.

A. Staminal column bearing anthers at the top. Carpels closely united in a ring around a central axis, from which they fall away when ripe (Malveae).

Flowers more or less unisexual. Styles with linear decurrent stigmas. Carpels usually solitary in the New Zealand species .. .. 1. PLAGIANTHUS.
Flowers perfect. Stigmas capitate. Carpels several, indehiscent, winged at the back .. .. 2. HOHERIA.
Flowers perfect. Stigmas capitate. Carpels many, 2-valved, not winged .. .. 3. GAYA.

B. Staminal column bearing anthers at the side, naked and 5-toothed at the top. Carpels united into a capsule, dehiscing loculicidally (Hibisceae).

Bracteoles 5 to many. Capsule 5-celled, many-seeded .. .. 4. HIBISCUS.

1. **PLAGIANTHUS** Forst. 1776.

Trees or shrubs, rarely herbs. Leaves entire or lobed or serrate. Flowers usually small, hermaphrodite or unisexual, in axillary or terminal fascicles or panicles, or solitary. Bracteoles wanting, or small and distant from the calyx. Calyx 5-toothed or 5-fid. Staminal column split at the top into numerous filaments. Ovary 1-celled or 2–5-celled; ovules 1 in each cell; styles as many as the cells, clavate flattened or filiform, stigmatic along the inner side. Fruit of one or several carpels seceding from a common axis, indehiscent or splitting irregularly. Seed solitary, pendulous.

A small genus of about 12 species, confined to Australia and New Zealand, the species found in each country being endemic. The New Zealand species are practically dioecious, although a few hermaphrodite or female flowers are occasionally mixed with the males.

(*Plagianthus Lyallii* Hook. f. Handb. N.Z. Fl. (1864) 30 is now referred to *Gaya*. *P. linariifolia* Buch. in Trans. N.Z. Inst. xvi (1884) 394, t. 34, is *Coprosma Kirkii* Cheesem.)

Shrub, much branched. Leaves small, linear, entire. Flowers solitary or fascicled.. .. .. 1. *P. divaricatus.*
Small tree. Leaves linear-oblong, toothed. Flowers in few-flowered cymes .. .. 2. *P. cymosus.*
Tree, 30–60 ft. Leaves ovate or ovate-lanceolate, serrate. Flowers numerous, in decompound panicles .. .. 3. *P. betulinus.*

1. **P. divaricatus** *Forst. Char. Gen.* (1776) 86. — A glabrous much-branched shrub 4–8 ft. high; branches tough, slender, divaricating, often much interlaced. Leaves alternate or fascicled on short lateral branchlets; of young plants 1 in. long, linear-oblong, narrowed into rather long petioles, entire or sinuate; of mature plants $\frac{1}{4}$–$\frac{3}{4}$ in., narrow-linear or narrow linear-obovate, coriaceous, obtuse, quite entire, 1-nerved. Flowers very small, generally unisexual, yellowish-white, solitary or fascicled, axillary; peduncles shorter than the leaves. Calyx hemispherical, 5-toothed. Petals small,

oblong-obovate, veined. Staminal tube with 8–12 large sessile anthers. Ovary 1-celled, rarely 2-celled; ovules 1 in each cell; styles the same number as the cells, clavate or flattened. Fruiting-carpel about the size of a peppercorn, globose or rarely didymous, downy, bursting irregularly. Seeds solitary, or very rarely 2.—*A. Rich. Fl. Nouv. Zel.* (1832) 299; *A. Cunn. Precur.* (1839) n. 604; *Raoul Choix* (1846) 48; *Hook. Bot. Mag.* (1833) t. 3271; *Hook. f. Fl. Nov. Zel.* i (1853) 29; *Handb. N.Z. Fl.* (1864) 30; *Buch. in Trans. N.Z. Inst.* xvi (1884) t. 34. f. 2; *T. Kirk Students' Fl.* (1899) 70; *Cheesem. Man. N.Z. Fl.* (1906) 76.

North and South Islands, Stewart Island, Chatham Islands: Abundant in salt-water marshes from the North Cape to the Bluff, but rare south of Foveaux Strait. September–October.

In the male flowers the ovary is smaller, almost rudimentary, and the style altogether enclosed within the staminal column; in the females the style is exserted, and the anthers are smaller and usually empty.

2. **P. cymosus** *T. Kirk Students' Fl.* (1899) 70. — A small closely branched tree about 20 ft. in height, glabrous except a few scattered stellate hairs on the young shoots and branches of the inflorescence. Leaves alternate or in alternate fascicles, $\frac{1}{2}$–$1\frac{1}{4}$ in. long, linear or linear-oblong or linear-obovate, obtuse or subacute, with a few deep serratures towards the tip; petioles slender, $\frac{1}{4}$–$\frac{1}{2}$ in. long. Flowers small, unisexual, in small axillary 5–15-flowered cymes, 1–$1\frac{1}{2}$ in. long, or in fascicles of 3–5, rarely solitary. Calyx campanulate, 5-toothed, narrower in the female flowers. Petals 5, ovate-spathulate or oblong-spathulate, much reduced in size in the females. Staminal column long and slender, with numerous anthers at the top. Ovary 1–2-celled; styles 1–2, clavate or broad and flattened. Fruiting-carpels about $\frac{1}{5}$ in. diam., didymous or globose, downy, seated in the persistent calyx.—*Cheesem. Man. N.Z. Fl.* (1906) 77; *Ill. N.Z. Fl.* i (1914) t. 21.

North Island: Peat swamp at Lake Tongonge, near Kaitaia, *R. H. Matthews!* South Island: Lower part of Pelorus Valley, Marlborough, abundant, *H. J. Matthews* and *J. H. Macmahon!* Upper Waimakariri, *J. D. Enys.*, alt. 2800 ft. (T. Kirk Students' Fl.); Port Hills, just above Lyttelton, *Cockayne* and *Petrie;* vicinity of Dunedin, *Thomson! Petrie!* McLennan River, near Catlin's, *E. Phillips Turner!* October.

A very peculiar plant, standing about half-way between *P. divaricatus* and *P. betulinus*, and presenting much of the appearance that a hybrid between the two might be presumed to take. With the exception of the Waimakariri habitat, about which nothing is known, it usually, if not invariably, occurs in localities where both *P. divaricatus* and *P. betulinus* are abundant. It is also remarkably rare in several of its known stations. Only one plant has been found at Dunedin, and for several years only one was known at Kaitaia. This rarity is easily explicable on the assumption of a hybrid origin, but difficult to account for in any other manner.

3. **P. betulinus** *A. Cunn. Precur.* (1839) n. 605.—A handsome leafy tree 30–60 ft. high, with a trunk sometimes 3 ft. in diam.; when young forming a straggling bush with interlaced tortuous branches. Bark exceedingly tough; branchlets, young leaves, petioles, and inflorescence more or less hoary with stellate hairs. Leaves of young plants small, $\frac{1}{3}$–$\frac{3}{4}$ in. long, broadly ovate or rounded to ovate-lanceolate, deeply and irregularly lobed or crenate-serrate. Leaves of mature plants 1–3 in. long, ovate or ovate-lanceolate, acuminate, coarsely crenate-serrate or doubly serrate, rounded or cuneate at the base, membranous; petioles slender, $\frac{1}{2}$–1 in. long. Flowers small, unisexual, very numerous, in terminal and axillary decompound panicles 4–9 in. long; pedicels slender. Calyx

Characters of some Malvaceae

Genus or species.	Carpels	Stigmas	Partial fruits	Wings of fruit	Habit.
Plagianthus	1-5	oblique	rounded or sub-coriaceous	none	Trees or shrubs
Hoheria populnea	5	capitate	compressed membraneous	large	Trees or shrubs
H. sexstylosa	6-7	"	" "	"	" "
H. lyallii	10-15	oblique	" "	small	" "
H. glabrata	10-15	obliquely capitate	" "	none	" "
Sida	5	capitate	" "	"	Herbs or under-shrubs

From Kew Bulletin, 1926 (Sprague & Summerhayes) p. 217.

HOHERIA, A. Cunn.

Sect 1. Euhoheria.
Species: H. populnea, H sexstylosa etc.
("this section is in need of revision, as the status of several of the supposed species is doubtful.")

Sect 11. Apterocarpa.
Species: H. lyallii, H. glabrata.

Revision of species.

1. Hoheria lyallii, Hook.f. (syn. Gaya lyallii, J.E. Baker.) F. Muell.)
2. H. glabrata, nob. Sprague & Summerhayes. (syn. Gaya lyallii var. ribifolia,
See Kew Bulletin 1926, p. 219 (Sprague & Summerhayes)

new species. Gaya allanii, Ckn. South Is. Peel forest ....flowers in January. see T.N.Z.I. Vol. 56, p. 24.

campanulate, 5-toothed. Petals oblong-spathulate, obtuse, clawed, much smaller in the female flowers. Staminal column exserted in the males, long and slender, bearing numerous almost sessile anthers at the tip. Fruiting-carpels $\frac{1}{6}$ in. diam., seated in the persistent veined calyx, ovoid, acuminate, downy. Seed solitary.—*Raoul Choix* (1846) 48; *Hook. f. Fl. Nov. Zel.* i (1853) 29; *Handb. N.Z. Fl.* (1864) 30; *T. Kirk Forest Fl.* (1889) tt. 103, 104; *Students' Fl.* (1899) 71; *Cheesem. Man. N.Z. Fl.* (1906) 77. P. urticinus *A. Cunn. Precur.* (1839) n. 606. P. Chathamicus *Cockayne in Trans. N.Z. Inst.* xxxiv (1902) 319 (*name only*). Phillipodendron regium *Poit. in Ann. Sci. Nat.* Ser. ii, viii (1837) t. 3. T. 44 (1912) 43.

North and South Islands, Stewart Island, Chatham Islands: Lowland forests from Mangonui and Kaitaia southwards, but often local. Ascends to 1500 ft. November–December. *Ribbon-wood* of Europeans; *manatu* of the Maoris.

Practically dioecious, although a few hermaphrodite flowers are sometimes mixed with the males. The male flowers are whitish-yellow, and are produced in immense profusion; the ovary is much reduced in size, and the style always included in the staminal column. The females are greenish, smaller and less numerous, the petals are smaller and adnate for some distance to the staminal column, the anthers are devoid of pollen, and the style exserted.

Dr. Cockayne separates his *P. chathamica* on the ground of its not passing through a young stage with foliage differing from that of the mature tree. Flowering specimens from the Chatham Islands in my herbarium have rather larger calyces than the type, but I can see no other difference. For a full description of the seedlings and young plants of both forms, reference should be made to Dr. Cockayne's paper, "An Inquiry into the Seedling Forms of New Zealand Phanerogams and their Development, Part IV" (Trans. N.Z. Inst. xxxiii (1901) 273–82).

2. **HOHERIA** A. Cunn. 1839.

A shrub or small tree. Leaves petiolate, alternate, serrate. Flowers numerous, in axillary fascicles, white; peduncles jointed at the middle. Bracteoles wanting. Calyx hemispherical, 5-toothed. Petals oblique, notched near the apex. Staminal column split at the top into numerous filaments, usually arranged in 5 bundles. Ovary 5-celled, rarely more; ovules 1 in each cell; style-branches as many as the cells, filiform; stigmas capitate. Fruiting-carpels 5, placed round a central axis from which they fall away when ripe, indehiscent, furnished with a broad membranous wing at the back. Seed pendulous.

A genus confined to New Zealand. It is doubtful whether it should be regarded as composed of one highly variable species or of 3 or possibly 4 closely allied ones. In the previous edition I followed Hooker in adopting the first-mentioned course, but further consideration has now induced me to accept as species three of the four varieties originally proposed by Hooker in the "Flora Novae-Zelandiae."

Leaves broad-ovate, with large sharp teeth; blade 3–5 in. long.
Flowers in 5–10-flowered fascicles, 1 in. diam. .. .. 1. *H. populnea.*
Leaves ovate-lanceolate or lanceolate, serrate; blade 2–5 in. long.
Flowers in 2–5-flowered fascicles, $\frac{3}{4}$ in. diam. .. .. .. 2. *H. sexstylosa.*
Leaves linear-oblong, spinulose-toothed, obtuse. Flowers small, $\frac{1}{3}$ in. diam. .. .. 3. *H. angustifolia.*

1. **H. populnea** *A. Cunn. Precur.* (1839) n. 600.—A small handsome tree 12–30 ft. high, glabrous except the young shoots, peduncles, and calyces, which are usually more or less pubescent; bark tough, dark-brown; branches slender, glabrous. Leaves of young plants (also occasionally found on the lower branches of old ones) very variable in size and shape, usually shorter and rounder and broader than those of the adult, 1–2$\frac{1}{2}$ in. long or more, deeply and coarsely dentate or even lobed, 1–3 in. long,

H. mata S. + T. 72 (1942) 24

broadly ovate-deltoid or almost orbicular, usually thin and membranous, conspicuously veined. Leaves of mature trees 3–5 in. long or more, ovate, long acuminate, deeply and coarsely doubly serrate, coriaceous, finely reticulated, often purplish beneath. Flowers large, ¾–1 in. diam., pure-white, arranged in 4–10-flowered fascicles; peduncles ¾–1 in. long.—*Hook. Ic. Plant.* (1843) tt. 565–66; *Hook. f. Fl. Nov. Zel.* i (1853) 30; *Handb. N.Z. Fl.* (1864) 31; *T. Kirk Forest Fl.* (1889) t. 53; *Students' Fl.* (1899) 71; *Cheesem. Man. N.Z. Fl.* (1906) 78. H. Sinclairii *Hook. f. Handb. N.Z. Fl.* (1864) 31.

North Island: From the North Cape to the Waikato River, abundant. March–May. *Houhere; Hoihere.*

An exceedingly handsome and graceful plant, now widely planted in shrubberies throughout the Dominion.

I regret that in the first edition I accepted without due inquiry Mr. Kirk's statement to the effect that *H. populnea* did not pass through a juvenile stage markedly different to the adult. It is quite easy to prove the contrary. In this matter I have to thank Mr. Carse for a full series of specimens showing the extent of the change in the Mangonui district. T. 57 (1926) 55.

2. **H. sexstylosa** *Col. in Trans. N.Z. Inst.* xvii (1885) 238.—An erect somewhat fastigiate much-branched tree 12–25 ft. high; branches slender, glabrous; bark dark reddish-brown; young shoots, peduncles, and calyces more or less pubescent. Leaves of young trees (also frequently found on the lower branches of old ones) very variable in size and shape, 1–3 in. long, ovate-lanceolate to oblong, or rounded-ovate to almost orbicular, often deeply lobed or incised. Leaves of mature trees 2–5 in. long, lanceolate or oblong-lanceolate, acute or acuminate, sharply and deeply serrate; finely reticulate, glabrous when mature, or the petioles clothed with stellate pubescence. Flowers numerous, ¾ in. diam. or more, arranged in 2–5-flowered fascicles; peduncles ¾–1 in. long.—H. populnea *var.* lanceolata *Hook. f. Fl. Nov. Zel.* i (1853) 30; *Handb. N.Z. Fl.* (1864) 31; *T. Kirk Forest Fl.* tt. 54 f. 2, 54A f. 1, 2, 55A; *Students' Fl.* (1899) 71; *Cheesem. Man. N.Z. Fl.* (1906) 79.

North and South Islands: From the Kaipara Harbour southwards to Canterbury, but local to the north of the Waikato River. March–April. *Houhere; Hoihere; Ribbon-wood; Lacebark.* Sea-level to 2500 ft.

3. **H. angustifolia** *Raoul in Ann. Sci. Nat.* Ser. iii, ii (1844) 122.—A small slender tree 12–25 ft. high or more; branches spreading, bark dark-brown; branchlets, petioles, and inflorescence more or less clothed with stellate pubescence. Young plants forming a straggling bush with numerous flexuose and interlaced branchlets; the leaves of which are small, ¼–⅓ in. long, orbicular or obovate-orbicular, cuneate at the base, 3–5-toothed towards the tip. Leaves of mature plants 1–2 in. or rarely 1–3 in. long, linear-oblong or lanceolate, rarely broader and oblong-lanceolate, obtuse or rounded at the tip, rarely acute, sharply spinulose-toothed, thin and membranous, glabrous when mature. Flowers smaller than in the other species, ⅓ in. diam., arranged in 2–4-flowered fascicles; peduncles usually much shorter than the leaves. Styles 5. Carpels 5, ⅛ in. long.—*Choix* (1846) 26, t. 26. H. populnea *var.* angustifolia *Hook. f. Fl. Nov. Zel.* i (1853) 30; *Handb. N.Z. Fl.* (1864) 31; *T. Kirk Forest Fl.* (1889) tt. 54 f. 1, 54A f. 3, 54B f. 2, 55 f. 1, 2; *Students' Fl.* (1899) 72; *Cheesem. Man. N.Z. Fl.* (1906) 79.

North and South Islands: Hawke's Bay (Wairoa) and Wanganui southwards to Southland, not uncommon. Sea-level to 3500 ft. January.

If Raoul's plant alone be taken into consideration, this is by far the most distinct of the various forms included in the genus *Hoheria*. It can be recognized at a glance by the linear-oblong spinulose-dentate leaves of the mature plant, and by the leaves of the juvenile plant, so very dissimilar in both size and shape. But Mr. Kirk's var. *obtusifolia* appears to connect it with *H. sexstylosa*.

3. **GAYA** H. B. K.

Herbs or shrubs, rarely small trees, usually tomentose with stellate hairs. Flowers pedunculate, axillary or terminal. Bracteoles wanting. Calyx 5-fid. Staminal column split at the apex into numerous filaments. Ovary many-celled; style-branches as many as the cells, filiform; stigmas capitate or truncate; ovules solitary in each cell. Mature carpels membranous, connivent at the apex, separable from the axis, 2-valved at the back and leaving a free appendage within, which arises from the base of the carpel and partly surrounds the seed. Seed pendulous or horizontal.

Species 8–12, all South American except the present one, which is endemic in New Zealand.

1. **G. Lyallii** *J. E. Baker in Journ. Bot.* xxx (1892) 137.—A small graceful spreading tree 15–30 ft. in height; young branches, leaves, petioles, and inflorescence more or less covered with stellate pubescence. Leaves deciduous, on slender petioles 1–2 in. long; blade 2–4 in., ovate, acuminate, usually deeply doubly crenate, sometimes shortly lobed and crenate, cordate and truncate at the base, membranous. Flowers abundantly produced, large, $\frac{3}{4}$–1 in. diam., white, in axillary fascicles of 3–5, rarely solitary; peduncles slender, 1–2 in., ebracteolate. Calyx broadly campanulate, 5-lobed; lobes triangular. Petals obliquely obovate, retuse towards the apex. Staminal column short, swollen at the base; filaments numerous, long, filiform. Ovary 10–15-celled; styles long, slender, filiform, free to below the middle; stigmas obliquely capitate. Fruit $\frac{1}{2}$ in. diam., globose, slightly depressed, of about 12 much-flattened membranous reniform carpels. Carpels not winged, 2-valved, 1-seeded. Seed much compressed. —*T. Kirk Students' Fl.* (1899) 72; *Cheesem. Man. N.Z. Fl.* (1906) 80. Hoheria Lyallii *Hook. f. Fl. Nov. Zel.* i (1853) 31, t. 11. Plagianthus Lyallii *Asa Gray ex Hook. f. l.c.* ii (1855) 326; *Hook. f. Handb. N.Z. Fl.* (1864) 30; *Bot. Mag.* (1871) t. 5935; *T. Kirk Forest Fl.* (1889) t. 134. Sida Lyallii *F. Muell. Veg. Chath. Is.* (1864) 11.

Var. **ribifolia** *F. Muell. Veg. Chath. Is.* (1864) 11.—Leaves deeply lobed or incised, usually smaller and not so acuminate; stellate pubescence more conspicuous, especially on the under-surface.—G. ribifolia *Cockayne in Trans. N.Z. Inst.* xxxviii (1906) 373.

South Island: Subalpine forests from Nelson to Otago, most plentiful on the western side, often forming a broad fringe to the subalpine beech forests. Ascends to 3500 ft. *Lacebark.* December–January.

One of the beautiful trees of the New Zealand Flora. There are apparently two forms of flowers, one with long styles almost equalling the stamens, the other with styles less than $\frac{1}{2}$ their length.

4. **HIBISCUS** Linn.

Herbs, shrubs, or trees; glabrous, tomentose, or hispid, the hairs usually stellate. Leaves very various, often more or less palmately lobed. Flowers

large and showy. Bracteoles numerous, rarely few, usually narrow, free or connate at the base. Calyx 5-toothed or 5-fid, valvate. Petals 5, adnate at the base to the staminal column. Staminal column truncate or 5-toothed at the summit; filaments many, inserted on the sides of the column; anthers reniform. Ovary 5-celled; ovules 3 or more in each cell; styles 5, spreading; stigmas capitate. Capsule loculicidally 5-valved. Seeds glabrous, hairy, or woolly.

H. Radcanii Lehmann. Nr? Pflanzen. 21:181.

A large and beautiful genus, abundant in the tropical regions of both hemispheres, a few species only extending into the North or South Temperate Zones. Both the New Zealand species have a wide distribution outside the Dominion.

Annual or biennial, 1–2 ft. Leaves deeply lobed. Flowers axillary	1. *H. trionum.*
Perennial, 3–6 ft.; stem prickly. Leaves broad, lobes shallow. Flowers in terminal racemes	2. *H. diversifolius.*

1. **H. trionum** *Linn. Sp. Plant.* (1753) 697.—A simple or branched annual or biennial 1–2 ft. high, scabrous-pubescent or hispid; branches erect or spreading. Leaves very variable, 1–3 in. long, lower orbicular-cordate with 3–5 shallow lobes, middle and upper deeply 3–5-lobed or -partite; segments oblong or lanceolate, coarsely toothed or incised. Flowers on short axillary peduncles, large, 1–1½ in. diam., pale-yellow with a dark-brown centre. Bracteoles 7–12, narrow-linear, hispid. Calyx membranous, inflated, with numerous raised hispid veins, shortly 5-lobed. Capsule ovoid-globose, hirsute, enclosed in the bladdery calyx. Seeds glabrous.—*Bot. Mag.* (1795) t. 209; *Hook. f. Fl. Nov. Zel.* i (1853) 28; *Handb. N.Z. Fl.* (1864) 31; *Benth. Fl. Austral.* i (1863) 210; *T. Kirk Students' Fl.* (1899) 73; *Cheesem. Man. N.Z. Fl.* (1906) 81. H. vesicarius *Cav. Diss.* iii, 171, t. 64, f. 2; *A. Cunn. Precur.* (1839) n. 607; *Raoul Choix* (1846) 48.

North Island: Sheltered places near the sea, from the North Cape to the Auckland Isthmus, always rare and local, now practically confined to the North Cape district. Hicks Bay, East Cape district, *Bishop Williams.* South Island: South Wanganui, *Lyall.* In most tropical countries outside America.

2. **H. diversifolius** *Jacq. Ic. Plant. Rar.* t. 551.—A tall stout and rigid perennial 3–6 ft. high, often woody at the base; branches, petioles, and nerves of the leaves covered with short conical prickles. Leaves on stout petioles 2–3 in. long; blade 2–4 in., broadly cordate or nearly orbicular, irregularly toothed, angular or slightly 3–5-lobed, scabrous. Flowers in terminal racemes, large, handsome, 2–3 in. diam., pale-yellow with a dark centre. Pedicels short; bracts lanceolate or 3-fid. Bracteoles 10, linear. Calyx-lobes lanceolate, bristly. Capsule ovoid, acuminate, densely hispid.—*Benth. Fl. Austral.* i (1863) 213; *T. Kirk in Trans. N.Z. Inst.* iii (1871) 163; *Students' Fl.* (1899) 73; *Cheesem. Man. N.Z. Fl.* (1906) 81.

North Island: Moist sandy places near the sea, from the North Cape to Hokianga and the Bay of Islands, rare, *Colenso, T. Kirk! R. H. Matthews! T. F. C.* Also in Australia, the Pacific islands, tropical Africa, &c.

Both this and the preceding species are being rapidly destroyed by cattle, fires, &c., and are now rare or almost extinct in localities where they were plentiful twenty or thirty years ago.

Hypericaceae.

Family LXVIII. GUTTIFERAE.

Trees, shrubs, or herbs, often furnished with a yellow or greenish juice. Leaves opposite or rarely whorled, coriaceous or membranous, often punctate with pellucid glands; stipules rarely present. Flowers axillary or terminal, solitary or cymose or panicled, hermaphrodite, polygamous, or dioecious. Sepals 5, rarely fewer. Petals usually 4–5, rarely more, generally much contorted in bud. Stamens numerous, hypogynous; filaments free or collected into as many bundles as there are petals; anthers usually versatile. Ovary of 3–5 carpels; styles as many, free or united; ovules few or many, axile or erect from the base of the cell. Fruit capsular or berried. Seed exalbuminous.

A family containing about 45 genera and 850 species, mostly inhabiting the tropics of both hemispheres. Several species yield valuable timber; others produce a delicious fruit, of which the mangosteen (*Garcinia*) is the best known example. The single New Zealand genus has a wide distribution, and differs in several respects from the remainder of the family, so that many botanists treat it as a distinct family.

HYPERICUM Linn.

Herbs or shrubs. Leaves opposite or rarely whorled, thin, usually sessile, entire or rarely minutely toothed. Flowers generally yellow, solitary or cymose, terminal or axillary. Sepals 5. Petals 5, smooth within. Ovary either 1-celled with 3–5 parietal placentas, or 3–5-celled through the placentas meeting in the axis; styles distinct or united at the base; ovules usually numerous. Capsule septicidal or dehiscing at the placentas. Seeds not winged.

A rather large genus comprising over 200 species, widely dispersed, but particularly abundant in south Europe, western Asia, and North America.

Erect or nearly so. Leaves subcordate at the base, with revolute margins .. .. 1. *H. gramineum.*
Procumbent. Leaves oblong or obovate, margins flat .. .. 2. *H. japonicum.*

1. **H. gramineum** *Forst. f. Prodr.* (1786) n. 281.—A perfectly glabrous strict and wiry perennial 4–12 in. high or more. Stems branched from the base, erect or ascending, 4-angled, sparingly leafy. Leaves $\frac{1}{3}$–$\frac{3}{4}$ in. long, rarely more, oblong or oblong-lanceolate, cordate at the base and stem-clasping, obtuse, quite entire, marked with numerous pellucid dots; margins more or less revolute. Flowers $\frac{1}{3}$–$\frac{1}{2}$ in. diam., sometimes solitary in small specimens, but usually in terminal trichotomous cymes, with a pair of bracts at the base of each fork; pedicels strict, erect. Sepals oblong-lanceolate, acute or obtuse. Petals longer than the sepals, golden-yellow. Capsule ovoid, acute, 1-celled, 3-valved, usually longer than the sepals.—*Hook. f. Fl. Nov. Zel.* i (1853) 36; *Handb. N.Z. Fl.* (1864) 29; *Benth. Fl. Austral.* i (1863) 182; *T. Kirk Students' Fl.* (1899) 67; *Cheesem. Man. N.Z. Fl.* (1906) 74. Brathys Forsteri *Spach in Ann. Sci. Nat.* Ser. 2, v. 367; *Raoul Choix* (1846) 47.

North and South Islands: From Whangaroa North (*Petrie!*) to the south of Otago, but rare and local to the north of Hawke's Bay. Altitudinal range from sea-level to 2000 ft. Also found in Australia and Tasmania, and in New Caledonia.

2. **H. japonicum** *Thunb. Fl. Jap.* (1784) 295, t. 31.—A slender procumbent or diffuse much or sparingly branched plant 2–6 in. high; branches ascending at the tips. Leaves small, $\frac{1}{6}$–$\frac{1}{3}$ in., broadly oblong or oblong-

ovate or obovate-oblong, obtuse, quite entire, often glaucous, marked with pellucid dots, sessile; margins usually flat. Flowers smaller than in *H. gramineum*, solitary or in few-flowered cymes; pedicels short, slender. Sepals oblong or ovate, obtuse or subacute. Petals slightly exceeding the sepals. Capsule broadly ovoid, small.—*Hook. f. Fl. Nov. Zel.* i (1853) 37; *Handb. N.Z. Fl.* (1864) 29; *Benth. Fl. Austral.* i (1863) 182; *T. Kirk Students' Fl.* (1899) 67; *Cheesem. Man. N.Z. Fl.* (1906) 75. H. pusillum *Choisy Prodr. Hyp.* (1821) 50; *A. Cunn. Precur.* (1839) n. 596.

North and South Islands: Not uncommon in moist places, margin of swamps, &c., from the North Cape to Otago. Altitudinal range from sea-level to over 3000 ft.

Extends northwards through Australia and the Malay Archipelago to India, China, and Japan. Very closely allied to the preceding, but usually readily distinguished by its procumbent habit, broader flatter obtuse leaves and smaller fewer flowers.

The European *H. humifusum* Linn. has become naturalized in many places, and may easily be mistaken for *H. japonicum*. It is usually larger, with stiffer and more wiry stems and branches, larger and more pointed leaves which have a row of black glandular dots just inside the margin, and larger flowers with more pointed often glandular-toothed sepals.

Family LXIX. **ELATINACEAE.**

Small herbs or undershrubs, usually growing in wet places. Leaves opposite, stipulate. Flowers minute, regular, hermaphrodite. Sepals and petals each 2–5, free, imbricate. Stamens equal in number to the petals or twice as many, hypogynous, free; anthers versatile. Ovary free, 2–5-celled; styles as many as the cells, free from the base; stigmas capitate; ovules many, attached to the inner angles of the cells, anatropous. Capsule septicidal, the valves falling away from the persistent axis and septa. Seeds straight or curved; albumen wanting, or nearly so; embryo terete, radicle next the hilum.

A small and unimportant family, spread over the whole world. Genera 2; species about 30.

ELATINE Linn.

Small prostrate glabrous annuals, growing in water or wet places. Leaves opposite or whorled. Flowers small, axillary, usually solitary. Sepals 2–4, membranous, obtuse. Petals the same number. Ovary globose. Capsule membranous, the septa remaining attached to the axis or evanescent. Seeds cylindric, straight, or curved, longitudinally ridged and transversely wrinkled.

Species about 12, found in most temperate and subtropical regions.

1. **E. americana** *Arn. in Edinb. Journ. Nat. Sci.* i (1830) 431, var. **australiensis** *Benth. Fl. Austral.* i (1863) 178.—A small prostrate smooth and glabrous green or reddish annual, forming matted patches 1–4 in. diam.; stems branched, rooting at the nodes, succulent. Leaves small, shortly petioled, $\frac{1}{8}$–$\frac{1}{3}$ in. long, ovate or obovate or oblong, obtuse; margin usually furnished with a few distant glands; stipules minute, fugacious. Flowers minute, solitary, sessile. Sepals 3, obtuse. Petals often absent, when present 3, longer than the sepals. Styles 3. Stamens usually 3. Capsule globose-depressed, septa complete or evanescent at maturity. Seeds very

minute.—*T. Kirk Students' Fl.* (1899) 66; *Cheesem. Man. N.Z. Fl.* (1906) 73. E. americana *Hook. f. Fl. Nov. Zel.* i (1853) 27; *Handb. N.Z. Fl.* (1864) 28. E. gratioloides *A. Cunn. Precur.* (1839) n. 610.

North and South Islands, Stewart Island: Muddy places and margins of still waters, not uncommon.

The New Zealand plant, which is also found in Australia, differs from the typical form of the species, which is North American, in the flowers being always trimerous, while in America they are usually dimerous. Mr. Carse sends me a permanently submerged form, in which the leaves are quite half an inch in length.

Family LXX. **VIOLACEAE.**

Herbs, shrubs, or small trees. Leaves usually alternate, simple, entire lobed or cut, stipulate. Flowers regular or irregular, axillary, solitary or arranged in cymes or panicles, rarely racemose. Sepals 5, equal or unequal, imbricate. Petals 5, hypogynous, equal or unequal, lower one sometimes spurred, usually imbricate. Stamens 5, hypogynous; filaments short, broad; anthers erect, free or connate round the pistil; connective broad, usually produced beyond the cells into an appendage. Ovary free, 1-celled, with 3–5 parietal placentas; ovules many or few to each placenta. Fruit either a 3–5-valved capsule or a berry. Seeds usually small; embryo straight, in the axis of fleshy albumen.

A family scattered over the whole world, containing 18 genera and about 300 species. The roots of many of the species are emetic, and are used as a substitute for ipecacuanha. One of the New Zealand genera is found in most countries; the other two have a very limited distribution outside the Dominion.

Herbs. Flowers irregular, the lower petal produced into a spur.
Fruit a capsule .. .. 1. Viola.

Trees or shrubs. Flowers regular. Fruit a berry.
Anthers free .. .. 2. Melicytus.
Anthers coherent .. .. 3. Hymenanthera.

Kew Bulletin 21: 363. 1. **VIOLA** Linn.

Annual or perennial herbs of small size. Leaves tufted at the top of a short woody rootstock or alternate on creeping or trailing stems, stipulate. Flowers irregular, on radical or axillary 1-flowered peduncles. Sepals 5, slightly produced at the base. Petals 5, spreading, the lowest usually longer and spurred at the base. Anthers 5, nearly sessile, the connectives flat, produced into a thin membrane beyond the cells, the two lower often spurred at the base. Style swollen above, straight or oblique at the tip. Capsule 3-valved; valves elastic, each with a single parietal placenta. Seeds ovoid or globose.

A large genus, widely diffused in all temperate climates, the species probably numbering considerably over 200. Two of the New Zealand species are endemic, the third extends to Tasmania.

In most of the species of the genus the flowers are dimo[illegible] ich are usually produced early in the [illegible] large [illegible] utumn, [illegible]dance

[illegible] *kamii.*

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Elatine americana var. australiensis, Benth.
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see T.N.Z.I. vol. 57, p. 64.

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The New Zealand plant, which is also found in Australia, differs from the typical form of the species, which is North American, in the flowers being always trimerous, while in America they are usually dimerous. Mr. Carse sends me a permanently submerged form, in which the leaves are quite half an inch in length.

Family LXX. **VIOLACEAE.**

Herbs, shrubs, or small trees. Leaves usually alternate, simple, entire lobed or cut, stipulate. Flowers regular or irregular, axillary, solitary or arranged in cymes or panicles, rarely racemose. Sepals 5, equal or unequal, imbricate. Petals 5, hypogynous, equal or unequal, lower one sometimes spurred, usually imbricate. Stamens 5, hypogynous; filaments short, broad; anthers erect, free or connate round the pistil; connective broad, usually produced beyond the cells into an appendage. Ovary free, 1-celled, with 3–5 parietal placentas; ovules many or few to each placenta. Fruit either a 3–5-valved capsule or a berry. Seeds usually small; embryo straight, in the axis of fleshy albumen.

A family scattered over the whole world, containing 18 genera and about 300 species. The roots of many of the species are emetic, and are used as a substitute for ipecacuanha. One of the New Zealand genera is found in most countries; the other two have a very limited distribution outside the Dominion.

Herbs. Flowers irregular, the lower petal produced into a spur.
Fruit a capsule .. .. 1. Viola.

Trees or shrubs. Flowers regular. Fruit a berry.
Anthers free .. .. 2. Melicytus.
Anthers coherent .. .. 3. Hymenanthera.

21:363. 1. **VIOLA** Linn.

Annual or perennial herbs of small size. Leaves tufted at the top of a short woody rootstock or alternate on creeping or trailing stems, stipulate. Flowers irregular, on radical or axillary 1-flowered peduncles. Sepals 5, slightly produced at the base. Petals 5, spreading, the lowest usually longer and spurred at the base. Anthers 5, nearly sessile, the connectives flat, produced into a thin membrane beyond the cells, the two lower often spurred at the base. Style swollen above, straight or oblique at the tip. Capsule 3-valved; valves elastic, each with a single parietal placenta. Seeds ovoid or globose.

A large genus, widely diffused in all temperate climates, the species probably numbering considerably over 200. Two of the New Zealand species are endemic, the third extends to Tasmania.

In most of the species of the genus the flowers are dimorphic; some, which are usually produced early in the flowering season, having conspicuous flowers with large petals, as a rule ripening few seeds; others, which appear in late summer or autumn, being much smaller, with either minute petals or none at all, but which ripen abundance of seed. These are usually called cleistogamic flowers.

Stems slender, elongated. Leaves cordate. Stipules and bracts lacerate .. .. 1. *V. filicaulis.*
Stems slender. Leaves cordate. Stipules and bracts entire .. 2. *V. Lyallii.*
Stems short. Leaves ovate. Stipules and bracts entire .. 3. *V. Cunninghamii.*

1. **V. filicaulis** *Hook. f. Fl. Nov. Zel.* i (1853) 16.—Slender, perfectly glabrous. Stems numerous, almost filiform, prostrate, sometimes ascending at the tips. Leaves alternate, ovate-cordate orbicular-cordate or almost reniform, $\frac{1}{4}$–$\frac{2}{3}$ in. diam., obtuse or subacute, obtusely crenate; petioles slender. Stipules broad, deeply laciniate; teeth filiform, often glandular-tipped. Peduncles slender, 2–4 in. long; bracts about the middle, linear, toothed or lacerate. Flowers $\frac{1}{2}$ in. diam. Sepals linear-lanceolate. Petals spathulate; spur short.—*Handb. N.Z. Fl.* (1864) 16; *T. Kirk Students' Fl.* (1899) 40; *Cheesem. Man. N.Z. Fl.* (1906) 44.

Var. **hydrocotyloides** *T. Kirk Students' Fl.* (1899) 41.—Much smaller, sparingly pilose. Leaves $\frac{1}{6}$–$\frac{1}{4}$ in. diam. Peduncles short.—V. hydrocotyloides *J. B. Armstr. in Trans. N.Z. Inst.* xiv (1882) 360.

North and South Islands, Stewart Island: River-valleys and moist places southwards from the Hokianga Plateau. Var. *hydrocotyloides:* Otago, *Petrie!* Stewart Island, *Stack! Petrie! T. Kirk!* Altitudinal range from sea-level to 4500 ft. November–February.

The long creeping stems, small leaves, and fimbriate bracts and stipules distinguish this from the two following. It produces numerous reduced or cleistogamic flowers late in summer and autumn.

2. **V. Lyallii** *Hook. f. Handb. N.Z. Fl.* (1864) 16.—Perfectly glabrous. Stems slender, shorter than in *V. filicaulis*, ascending at the tips. Leaves $\frac{1}{3}$–1 in. diam., broadly ovate or rounded, deeply cordate at the base, obtuse or subacute, obscurely crenate or nearly entire; petioles variable in length, 2–6 in. Stipules linear, entire. Peduncles very slender, variable in length, 3–7 in. Bracts usually above the middle, linear, entire. Flowers $\frac{1}{2}$ in. diam., white streaked with lilac and yellow.—*T. Kirk Students' Fl.* (1899) 41; *Cheesem. Man. N.Z. Fl.* (1906) 45. V. Cunninghamii *var.* gracilis *Hook. f. Fl. Nov. Zel.* i (1853) 16. Erpetion spathulatum *A. Cunn. Precur.* (1839) n. 622 (*not of G. Don*).

North and South Islands: Not uncommon from Kaitaia and Hokianga southwards; ascending to 4000 ft. on the Mount Arthur Plateau, Nelson. October–January.

Usually a larger plant than the preceding, with the stem not so decidedly creeping, larger leaves and longer petioles, and with the stipules and bracts entire, not lacerate. The cordate leaves separate it from *V. Cunninghamii.*

3. **V. Cunninghamii** *Hook. f. Fl. Nov. Zel.* i (1853) 16.—Glabrous except the petioles, which are occasionally pubescent. Rootstock often somewhat woody, creeping below, often branched above. Leaves tufted at the top of the rootstock, or on short branches springing from it, $\frac{1}{2}$–1 in. diam., triangular-ovate or ovate-oblong, truncate at the base or narrowed into the petiole, obtuse or subacute, obscurely crenate; petioles short or long. Stipules adnate at the base to the petiole, usually entire, acute. Peduncles slender, exceeding the leaves; bracts linear, acute. Flowers $\frac{1}{3}$–$\frac{2}{3}$ in. diam., white, usually streaked with lilac and yellow. Sepals linear-oblong. Lateral petals bearded.—*Handb. N.Z. Fl.* (1864) 16; *T. Kirk Students' Fl.* (1899) 41. V. perexigua *Col. in Trans. N.Z. Inst.* xvi (1884) 326.

North and South Islands, Stewart Island: From Rotorua and the East Cape southwards; abundant in many places, especially in the mountains. Chatham Islands: *Buchanan* (Trans. N.Z. Inst. vii (1875) 334). Altitudinal range from sea-level to 5000 ft. October–January. Also found in Tasmania.

The short stems and tufted leaves, which are usually either truncate at the base or narrowed into the petioles, are the best distinguishing characters of this plant. It varies greatly in size; lowland specimens, growing among scrub, &c., sometimes have the petioles 8–9 in. long, and the peduncles of corresponding size, while alpine specimens are frequently much depauperated. The flowers of the latter, however, are usually larger than those of the lowland forms.

2. **MELICYTUS** Forst.

Trees or shrubs. Leaves petiolate, alternate, toothed or serrate; stipules minute. Flowers small, regular, dioecious, in little fascicles on the branches or axillary. Sepals 5, united at the base. Petals 5, short, spreading. Anthers 5, free, sessile; connective produced above into a broad membrane furnished with a scale at the back. Ovary 1-celled, with 3–5 parietal placentas. Style 3–6-fid at the apex, or stigma nearly sessile, lobed. Fruit a berry, with few or several angled seeds.

A small genus, limited to the four New Zealand species, one of which is also found in Norfolk Island, the Tongan Islands, and Fiji.

Leaves oblong or oblong-lanceolate, serrate	1. *M. ramiflorus.*
Leaves large, obovate, coriaceous, sinuate-serrate	2. *M. macrophyllus.*
Leaves long, linear-lanceolate, sharply and finely serrate ..	3. *M. lanceolatus.*
Leaves small, orbicular-ovate, sinuate-toothed	4. *M. micranthus.*

1. **M. ramiflorus** *Forst. Char. Gen.* (1776) 124, t. 62.—A glabrous tree or large shrub 20–30 ft. high, with a trunk 1–2 ft. in diam.; bark white; branches brittle. Leaves alternate, 2–5 in. long, oblong-lanceolate, usually with a short acuminate point but sometimes obtuse, bluntly and sometimes obscurely serrate, veins reticulate; petioles short, slender; stipules deciduous. Flowers small, $\frac{1}{8}$ in. diam., greenish, dioecious, in axillary fascicles or on the branches below the leaves; pedicels slender, $\frac{1}{3}$ in. long, with 2 minute bracts. Calyx-teeth 5, minute. Petals obtuse, spreading. Male flowers with 5 obtuse sessile anthers, each with a concave scale at the back. Females with a short conical ovary, crowned with a 4–6-lobed stigma. Berry small, violet-blue, $\frac{1}{5}$ in. diam.; seeds few, black, angled.—*A. Rich. Fl. Nouv. Zel.* (1832) 313; *A. Cunn. Precur.* (1839) n. 623; *Raoul Choix* (1846) 48; *Hook. f. Fl. Nov. Zel.* i (1853) 18; *Handb. N.Z. Fl.* (1864) 17; *T. Kirk Forest Fl.* (1889) t. 3; *Students' Fl.* (1899) 42; *Cheesem. Man. N.Z. Fl.* (1906) 46; *Ill. N.Z. Fl.* i (1914) t. 13.

Kermadec Islands, North and South Islands, Stewart Island: Abundant throughout, ascending to fully 3000 ft. *Mahoe.* November–January. Also found in Norfolk Island and the Tongan Islands, and has lately been discovered in Fiji by Miss L. S. Gibbs.

The leaves and young branches are greedily eaten by cattle; the wood is white and soft, but has been employed for producing a special kind of charcoal used in making gunpowder.

2. **M. macrophyllus** *A. Cunn. Precur.* (1839) n. 624.—A tall slender sparingly branched shrub 8–15 ft. high; bark brownish. Leaves 3–7 in. long, obovate or oblong, coarsely sinuate-serrate, acute or shortly acuminate, coriaceous; petioles short. Flowers twice as large as those of *M. ramiflorus*, $\frac{1}{4}$ in. diam., greenish, in 4–10-flowered fascicles; pedicels stout, decurved, $\frac{1}{2}$ in. long, with 2 rounded bracts just below the flower. Male flowers: Calyx-lobes broad, obtuse. Petals more than twice as

long as the calyx, spreading, strap-shaped, recurved at the tips. Anthers sessile, apiculate. Females: Calyx of the males. Petals shorter, more erect, barely ½ as long again as the calyx. Style short, stout; stigma broad, discoid, 3–5-lobed. Berry globose, ¼ in. diam.; seeds 4–6.—*Raoul Choix* (1846) 48; *Hook. f. Fl. Nov. Zel.* i (1853) 18; *Handb. N.Z. Fl.* (1864) 17; *T. Kirk Students' Fl.* (1899) 42; *Cheesem. Man. N.Z. Fl.* (1906) 47.

North Island: Not uncommon in hilly forests from Kaitaia southwards to the Waikato River. South Island: Waikari Creek, near Dunedin, *Thomson! Petrie!* Sea-level to 2000 ft. September–October.

Easily distinguished from *M. ramiflorus* by the larger, more coriaceous, obovate leaves, and larger flowers on decurved pedicels, with the bracts placed just below the flowers. The Otago specimens have smaller leaves, but are not otherwise different.

3. **M. lanceolatus** *Hook. f. Fl. Nov. Zel.* i (1853) 18, t. 8.—A slender glabrous shrub 6–15 ft. high, with brownish bark; branches succulent, brittle. Leaves 3–6 in. long, lanceolate or linear-lanceolate, acuminate, finely and sharply serrate, membranous; petioles short. Flowers small, in 2–5-flowered fascicles; pedicels short, slender, decurved, with 2 bracts above the middle. Calyx-lobes oblong, obtuse or subacute. Petals erect, recurved at the tip. Connective of the anthers produced into a long subulate point. Style long; stigmas 3, minute. Berry globose, ¼ in. diam., blue-black when fully ripe; seeds 6–12, angled, minutely tubercled. —*Handb. N.Z. Fl.* (1864) 17; *T. Kirk Students' Fl.* (1899) 43; *Cheesem. Man. N.Z. Fl.* (1906) 47.

North and South Islands, Stewart Island: Not uncommon in forests south of Whangarei. Ascends to 3000 ft. on Te Aroha Mountain. October–November.

This can be recognized by the narrow leaves, subulate appendage to the anthers, long 3-fid style, and minutely tuberculate seeds. The anthers often cohere at the back, as in *Hymenanthera*, but in habit and other respects the species agrees better with *Melicytus*.

ramiflorus × micranthus Syst. 71: 88.

4. **M. micranthus** *Hook. f. Fl. Nov. Zel.* i (1853) 18.—A shrub or small tree 5–15 ft. in height, very variable in habit, sometimes a much-branched bush with tortuous and interlaced rigid branches, at other times a small tree with a compact head and slender trunk 2–5 in. diam.; branchlets pubescent at the tips. Leaves alternate or fascicled on short lateral branchlets, coriaceous, small, ⅕–1 in. long, oblong-obovate or obovate or orbicular-obovate, obtuse, sinuate or toothed, rarely lobed; petioles short, puberulous. Leaves of young plants longer and narrower, often linear and pinnatifid. Flowers minute, axillary, solitary or 2–3 together; pedicels longer or shorter than the petioles, pubescent. Male flowers: Calyx-lobes short, rounded, often ciliate. Petals twice as long as the calyx, broadly oblong, obtuse. Anthers sessile, very broad, rounded, obtuse, connective flat. Females: Calyx and petals of the males. Abortive anthers present. Ovary ovoid; style short, thick; stigma large, discoid, with 3–5 fleshy lobes. Berry oval or subglobose, ⅛–¼ in. diam., purple or purple-black. Seeds 1–4, smooth or angled.—*Handb. N.Z. Fl.* (1864) 17; *T. Kirk Students' Fl.* (1899) 43; *Cheesem. Man. N.Z. Fl.* (1906) 47. Elaeodendron micranthum *Hook. f. in Lond. Journ. Bot.* iii (1844) 228, t. 8.

Var. **longiusculus** *Cheesem.* — Leaves usually larger, ½–1 in., oblong-obovate. Flowers on longer pedicels. Fruit small, globose, ⅛–⅙ in.

Var. **microphyllus** Cheesem. — Leaves smaller, ⅕–½ in., orbicular-obovate. Pedicels shorter. Fruit large, ovoid, ⅙–¼ in.—M. microphyllus *Col. in Trans. N.Z. Inst.* xix (1887) 260, *and* xx (1888) 189.

North and South Islands: Abundant in lowland forests, by the side of streams, &c., from the Bay of Islands to Otago. November–May.

Easily distinguished from all other species of *Melicytus* by the stiff rigid habit, small leaves, and minute few-seeded berries. It is exceedingly variable; and the two varieties characterized above are certainly connected by intermediate forms. I am much indebted to Mr. Carse for a fine series of flowering and fruiting specimens of both varieties, collected near Mauku, where they appear to grow intermixed. Mr. Colenso's herbarium also contains numerous well-selected specimens.

3. **HYMENANTHERA** R. Br.

Rigid woody shrubs. Leaves alternate or fascicled, entire or toothed; stipules minute, fugacious. Flowers small, regular, hermaphrodite or unisexual, solitary or fascicled, axillary or on the naked branches below the leaves. Sepals 5, obtuse, united at the base. Petals 5, rounded at the tip. Anthers 5, sessile, connate into a tube surrounding the pistil; connectives terminating in a toothed or fimbriate process, and furnished with an erect scale at the back. Style short; stigma 2-fid, rarely 3–4-fid. Fruit a small subglobose berry; seeds usually 2, rarely 3–4.

A small genus of about half a dozen species, found in New Zealand, Australia and Tasmania, and Norfolk Island. The New Zealand species are exceedingly difficult of discrimination. They vary greatly in the leaves and vegetative characters generally; and the flowers and fruit, so far as they are known, are very similar in all. Most of them occur in localities which are not easily reached, making it difficult to secure specimens in a proper state for comparison.

A much-branched shrub, branches flexuose and zigzag or depressed and densely compacted. Leaves linear or linear-cuneate	1. *H. dentata* var. *angustifolia.*
A much-branched rigid maritime shrub. Leaves small, linear-spathulate or linear-obovate, ⅓–1 in. long ..	2. *H. crassifolia.*
A stout or slender branching shrub. Leaves obovate, ¾–2 in. long. Flowers solitary or in 2–3-flowered fascicles	3. *H. obovata.*
Stout spreading shrub. Leaves large, 1½–4 in., ovate-oblong to obovate, sinuate-toothed. Flowers numerous. Berry 2-seeded	4. *H. novae-zelandiae.*
Tall erect shrub. Leaves large, 3–5 in., lanceolate or ovate-lanceolate, serrate. Flowers numerous. Berry 4-seeded	5. *H. chathamica.*

1. **H. dentata** *R. Br.* var. **angustifolia** *Benth. Fl. Austral.* i (1863) 104.—A much-branched frequently leafless rigid shrub, in sheltered situations 4–8 ft. high, with flexuous or zigzag often interlaced branches; in exposed or alpine places shorter and much dwarfed, with the branches densely compacted and ending in stout thorns. Branchlets terete or grooved, covered with minute lenticels. Leaves few or many, often altogether wanting, alternate or fascicled, ¼–¾ in. long, linear or linear-cuneate or linear-obovate, obtuse or retuse, entire or sinuate or irregularly lobed, varying from almost membranous to thick and coriaceous, narrowed into very short petioles. Flowers minute, solitary or geminate, on very short decurved peduncles, dioecious. Male flowers: Sepals rounded, with fimbriate margins.

Petals twice as long as the sepals, linear-oblong, recurved at the tips. Connective of the anthers with a narrow appendage toothed or fimbriate at the tip, and an oblong scale at the back. Females: Calyx and petals of the males, but rather smaller. Abortive anthers present. Style 2-fid. Berry 2-seeded; seeds oblong, flat on the inner face, convex on the outer.—*T. Kirk Students' Fl.* (1899) 44; *Cheesem. Man. N.Z. Fl.* (1906) 49.

Var. **alpina** *Kirk l.c.*—Much depressed, 1–2 ft. diam., forming a mass of densely compacted short and thick spinous branches. Leaves $\frac{1}{6}$–$\frac{1}{3}$ in. long, oblong or linear-obovate, very thick and coriaceous.

North Island: Wellington—Turangarere, *A. Hamilton!* Lake Tama (between Ngauruhoe and Ruapehu), *T. F. C.;* Upper Rangitikei, *Petrie!* South Island: Mountain districts from Nelson and Marlborough to Foveaux Strait, not uncommon. Stewart Island: Mount Anglem, *Cockayne, F. G. Gibbs;* Port Pegasus, *Cockayne.* Var. *alpina:* Clarence Valley and Lake Tennyson, *T. F. C.;* Broken River basin and other localities on the eastern side of the Southern Alps, *T. Kirk! J. D. Enys! Cockayne,* and others. Central Otago, abundant, *Petrie! H. J. Matthews!* and others.

In its usual state this curious plant is best distinguished from *H. crassifolia* by the more slender frequently leafless branches, which are usually thickly dotted with minute lenticels, and by the narrower leaves. The Nelson specimens, which are the only ones I have seen in flower, are certainly dioecious, but Tasmanian specimens are said to be hermaphrodite. But I think there can be little doubt that the New Zealand plant will prove to be distinct from the Australian.

H. alpina (T.K.). WRB.O. Rec. Dom. Mus. 1.(1944).
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2. **H. crassifolia** *Hook. f. Fl. Nov. Zel.* i (1853) 17, t. 7.—A low rigid prostrate or erect densely branched shrub 2–5 ft. high; branches tortuous, stout and woody, sometimes much interlaced, often hard and spinescent at the tip; bark greyish-white, usually studded with minute lenticels; branchlets pubescent. Leaves variable in size and shape, alternate or fascicled, very thick and coriaceous, $\frac{1}{3}$–$1\frac{1}{2}$ in. long, linear-spathulate or linear-obovate, entire or sinuate, rarely lobed, rounded or emarginate at the apex; petioles short, stout; stipules small, ovate, margins lacerate. Flowers very small, solitary or 2–3 together, axillary; peduncles shorter than the flowers, decurved, bearing 1–2 sheathing bracts about the middle. Sepals orbicular, with fimbriate margins. Petals narrow-oblong, obtuse, recurved at the apex. Anthers 5, the broad membranous connectives connate into a tube which carries a fimbriate projection above each anther and a broad scale at the back. Ovary 1-celled; style 2-fid. Berry purplish, broadly oblong, $\frac{1}{6}$–$\frac{1}{4}$ in. diam.; seeds 2.—*Handb. N.Z. Fl.* (1864) 18; *T. Kirk Students' Fl.* (1899) 44; *Cheesem. Man. N.Z. Fl.* (1906) 49.

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North Island: Northern shores of Cook Strait, *T. Kirk!* Kapiti Island, *B. C. Aston!* Wellington Heads, *T. Kirk! B. C. Aston! Cockayne, T. F. C.;* Cape Turakirae, *B. C. Aston!* Cape Palliser, *Colenso!* South Island: Nelson—Coast between the Boulder Bank and Croixelles Harbour, *T. Kirk, F. G. Gibbs! T. F. C.* Marlborough—Pelorus Sound, *J. Rutland.* Canterbury—Banks Peninusla, *J. B. Armstrong, Cockayne, R. M. Laing.* Otago—Reported from several localities, but the inland stations require verification. September–October.

A variable plant. It is allied on one side to *H. dentata* var. *angustifolia,* and on the other to *H. obovata.*

3. **H. obovata** *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 350.—An erect shrub 4–12 ft. high, in sheltered places slender and sparingly branched, in more exposed situations forming a compactly branched bush or even prostrate at the base. Branches stout or slender; bark greyish, often

H. crassifolia × obovata T. 57 (1926) 70.

covered with minute lenticels; branchlets glabrous or the younger ones very finely pubescent. Leaves of mature plants ¾–2 in. long, usually obovate but varying to linear-oblong or oblong-obovate, obtuse or emarginate, gradually narrowed into a short petiole, entire or with 1 or 2 irregular shallow notches on either side, dark-green above, paler beneath. Leaves of young plants membranous, obovate-cuneate, toothed or lobed. Flowers axillary or on the branches below the leaves, solitary or in fascicles of 2–4, dioecious. Males: About $\frac{1}{10}$–$\frac{1}{8}$ in. diam., pedicels decurved, equalling the flowers or shorter, bracteolate below the middle. Sepals ovate, obtuse, free almost to the base; margins minutely fimbriate. Petals free to the base, erect for the lower two-thirds, revolute at the tips, narrow-oblong, obtuse. Anthers coherent; connective produced above the anther into a lanceolate process as long as the anther and fimbriate at the tip; scale at the back of the anther exceeding it, narrow-cuneate. Females: Smaller than the males and less numerous, and on rather shorter pedicels. Petals shorter and broader in proportion. Abortive anthers present. Ovary ovoid; stigmas 2. Berry ovoid, purplish, 2-seeded; seeds plano-convex.—*Students' Fl.* (1899) 44; *Cheesem. Man. N.Z. Fl.* (1906) 50; *Cockayne in Trans. N.Z. Inst.* l (1918) 177.

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North Island: Coastal cliffs in several localities in Cook Strait. Kapiti Island, *B. C. Aston!* Titahi Bay, *B. C. Aston! Cockayne!* Wellington Heads, *B. C. Aston!* and others. South Island: Golden Bay, *B. C. Aston!* Riwaka, *T. Kirk, B. C. Aston! H. J. Matthews!* near Takaka, *Miss Hudson!* Graham River, *T. F. C., F. G. Gibbs!* Wangapeka River, *T. F. C.;* northern ascent of Mount Owen, above the Rolling River, *T. F. C.* Marlborough—Queen Charlotte Sound, *Banks* and *Solander!* Ship Cove and Pelorus Sound, *J. H. Macmahon!* Canterbury—Broken River basin, *J. D. Enys* and *T. Kirk!* Ashburton Mountains, *T. H. Potts!* Altitudinal range from sea-level to 3500 ft. October–November.

Apparently a very variable plant, judging from a personal inspection of it in several of the Nelson and Wellington localities. It is possible that the coastal form might with advantage be distinguished as a variety from the inland state; but on the whole I prefer to regard the differences as being due to the diversified character of the stations which the plant inhabits.

(A. Cunn.)

4. **H. novae-zelandiae** *Hemsl. in Kew Bull.* (1908) 95.—A stout sparingly branched shrub 3–10 ft. high; branches erect or straggling; bark covered with minute lenticels. Leaves alternate, variable in size and shape, 1½–4 in. long, ovate or ovate-lanceolate to obovate or obovate-oblong, coriaceous, obtuse or subacute, narrowed into a short stout petiole, sinuate or sinuate-serrate, rarely entire; margin thickened, slightly recurved; veins reticulate. Flowers dioecious, fascicled, $\frac{1}{10}$ in. diam. Males: Often very numerous and clustered on the branches for a considerable length, pedicels decurved, bracteolate about the middle. Sepals ovate-obtuse, free almost to the base. Petals twice as long as the sepals, linear-oblong, erect at the base, revolute at the tips. Anthers 5, connectives produced into a long and narrow projection above each anther which is almost as long as the anther and jagged at the tip. Females: Smaller and less numerous, on shorter pedicels, usually erect. Sepals and petals as in the males. Ovary ovoid; stigmas 2. Berry broadly ovoid or nearly globose, purplish; seeds 2, plano-convex, grooved on the convex face, with a large strophiole.—*Cheesem. Ill. N.Z. Fl.* i (1914) t. 14. H. latifolia *T. Kirk Students' Fl.* (1899) 45 (*not of Endl.*); *Cheesem. Man. N.Z. Fl.* (1906) 30. H. latifolia *var.* tasmanica *T. Kirk in Trans. N.Z. Inst.* iii (1871) 163. Scaevola novae-zelandiae *A. Cunn. Precur.* (1838) n. 429.

North Island: Three Kings Islands, *T. F. C.*; North Cape Peninsula, *T. Kirk! T. F. C.*; Mount Camel, *Buchanan!* Poor Knights Islands, *Cockayne*; Taranga Islands, *T. Kirk! T. F. C.*; Great Barrier and adjacent islets, *T. Kirk!* Little Barrier Island, most abundant, *T. Kirk! T. F. C., Miss Shakespear!* Waiheke Island, very rare, *T. Kirk!* Cuvier Island, *T. F. C.*; Whangapoua, *T. Kirk*; Shoe Island, *Adams!* Mayor Island and Karewa Island, *Dr. Thilenius!* August–September.

Mr. W. B. Hemsley ("Kew Bulletin," 1908, p. 95) has pointed out that the plant previously referred by New Zealand botanists to the Norfolk Island *H. latifolia* is in reality a distinct species. He states that the Norfolk Island plant has more slender branches, thin entire leaves, smaller flowers, and the staminal appendages are only fringed at the tips instead of being minutely toothed all round the margin. Mr. Hemsley has also satisfied himself that Cunningham's *Scaevola novae-zelandiae*, collected at Matauri Bay, opposite the Cavallos Islands, and which Hooker referred to his *H. crassifolia*, is really the same plant, thus rendering it necessary to restore Cunningham's specific name.

5. **H. chathamica**/*T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 514.—An erect glabrous shrub; bark furrowed, dotted with minute lenticels. Leaves alternate, 2–5 in. long, lanceolate or oblong-lanceolate, coriaceous, acute, narrowed into a short petiole, sharply toothed; margins thickened; veins reticulate on both surfaces. Flowers in crowded fascicles along the branches, dioecious; pedicels slender, longer than the flowers, decurved. Male flowers: Sepals ovate, free almost to the base. Petals more than twice as long as the sepals, revolute at the tips. Anthers with a lanceolate jagged connective more than ½ as long as the cells; dorsal scale cuneate-spathulate. Female flowers not seen. Berry ovoid or subglobose, white, usually 4-seeded. Seeds angled, outer surface convex; strophiole small.—*Students' Fl.* (1899) 45; *Cheesem. Man. N.Z. Fl.* (1906) 51. H. latifolia *var.* chathamica *F. Muell. Veg. Chatham Is.* (1864) 9.

North Island: Wellington—Patea, *Hector!* Chatham Islands: *G. Mair! H. H. Travers! F. A. D. Cox! Mahoe.* September–October.

There is little to separate this from the preceding except the longer and narrower sharply toothed leaves and the 4-seeded berry, and I doubt the constancy of this latter character. Sir James Hector's Patea specimens have neither flowers nor fruit, but appear to belong to the same species.

Family LXXI. **PASSIFLORACEAE.**

Climbing herbs or shrubs, rarely erect. Leaves usually alternate, entire or lobed or palmately divided, stipulate; petiole generally provided with glands. Tendrils often present, axillary. Flowers regular, hermaphrodite or unisexual, axillary, solitary or in cymes or racemes. Calyx-tube short or long; lobes 4–5, valvate or imbricate. Petals as many as the calyx-lobes or wanting, inserted on the calyx-tube, free or connate. Corona of one or more rows of filamentous appendages arising from the calyx-tube, rarely wanting. Stamens 3–5, rarely more, usually springing from the base of the calyx, but filaments often monadelphous and adnate to the stalk of the ovary to near the top. Ovary superior, free, elevated on a stalk (gynophore) or sessile, 1-celled, with 3–5 parietal placentas; styles 3–5 or single; ovules numerous, pendulous, anatropous. Fruit succulent or capsular. Seeds numerous, ovoid or compressed, often arillate; albumen fleshy; embryo straight, cotyledons flat.

A small family, chiefly tropical in its distribution, and most abundant in South America. Genera 18; species about 280. The fruit of several species of *Passiflora* (passion-fruit) is valued on account of the cooling and refreshing pulp surrounding the

seeds; the large-fruited kind, known as grenadilla, being specially prized. The very-different-looking papaw is now everywhere cultivated in the tropics for its large fruit, which, though insipid, is cooling and antiseptic.

The single genus found in New Zealand is endemic and monotypic, and only differs from the widely known *Passiflora* in the dioecious and tetramerous flowers.

Ann. Sc. Nat. 21: 507. **TETRAPATHAEA** Reichb. 1828.

A perfectly smooth and glabrous climbing plant, ascending to a great height; trunk woody, often 3–4 in. diam. Leaves simple, alternate, petiolate, oblong-lanceolate or ovate-lanceolate, acuminate, quite entire, smooth and glossy. Tendrils axillary, slender, elongated. Flowers in axillary 2–4-flowered cymes or solitary, unisexual, greenish; peduncles ebracteate. Calyx-lobes 4, oblong, obtuse. Petals the same number and about the same size. Corona of numerous yellowish filaments. Male flowers with 4 stamens; filaments long, diverging. Females with a stipitate ovary, usually with short barren stamens at the base; styles 2–3. Fruit nearly globose, orange, 1–1½ in. diam. Seeds numerous, compressed, wrinkled, black. (B+S 4+ DC)

1. **T. tetrandra** *Cheesem.*—Characters of the genus.—Passiflora tetrandra *Banks and Soland. ex DC. Prodr.* iii (1828) 323; *A. Cunn. Precur.* (1839) n. 524; *Hook. f. Fl. Nov. Zel.* i (1853) 73; *Handb. N.Z. Fl.* (1864) 81; *T. Kirk Students' Fl.* (1899) 182; *Cheesem. Man. N.Z. Fl.* (1906) 188. Tetrapathaea australis *Raoul Choix* (1846) 27, t. 27.

Ann. Sc. Nat., iii, 2: 121: 1844.

North and South Islands: From the North Cape to Banks Peninsula, ascending to 2500 ft. *Kohia; New Zealand Passion-fruit.* November–January.

Family LXXII. **THYMELAEACEAE.**

Shrubs or trees, rarely herbs, inner bark tough and stringy. Leaves opposite or alternate, simple and entire; stipules wanting. Flowers regular, hermaphrodite or rarely unisexual, in axillary or terminal heads or clusters, racemes or spikes, rarely solitary. Perianth inferior, gamophyllous, tubular or campanulate, often swollen at the base; throat usually furnished with scales or glands; limb with 4–5 imbricate lobes. Stamens as many or twice as many as the corolla-lobes (in *Pimelea* 2 only) inserted on the perianth-tube; anthers 2-celled. Ovary superior, 1-celled or rarely 2-celled; style short or long, terminal or lateral; stigma capitate; ovules solitary or 1 in each cell, pendulous, anatropous. Fruit indehiscent, a drupe or nut or berry. Seed pendulous, testa thin or crustaceous; albumen fleshy or wanting; embryo straight, cotyledons fleshy, radicle superior.

A family of moderate size, scattered over most parts of the world. Genera nearly 40, species estimated at 525. Many of the species are more or less acrid and caustic, as the spurge-laurel and mezereum, both of which are used in medicine. The roots of several furnish a yellow dye, and the tough inner bark of others is employed for cordage. *Lagetta lintearia* yields the well-known lacebark. Several species of *Daphne* and *Pimelea* are well-known garden-plants. Of the 2 New Zealand genera, *Pimelea* is found elsewhere in Timor and Lord Howe Island, where there is a single species in each locality, and in Australia, where it is largely developed; *Drapetes* has a wider range, extending to Australia and Borneo on one side and South America on the other.

No scales within the perianth. Stamens 2 .. .. .. 1. Pimelea.
Scales of the perianth 4 or 8. Stamens 4 .. .. .. 2. Drapetes.

1. **PIMELEA** Banks and Solander. 1788.

Shrubs or undershrubs, rarely herbs. Leaves opposite or alternate, usually small. Flowers hermaphrodite or polygamo-dioecious, usually terminal and capitate. Perianth-tube cylindrical; limb spreading, rarely erect, 4-lobed; throat without scales but sometimes thickened or folded. Stamens 2, inserted on the throat of the perianth opposite the 2 outer lobes; filaments slender; anthers introrse. Hypogynous disc wanting. Ovary 1-celled; style elongated; stigma capitate; ovule solitary, pendulous. Fruit small, drupaceous, included in the base of the perianth; epicarp dry or fleshy; endocarp crustaceous. Seed pendulous, with a membranous testa; albumen scanty or copious.

A very natural and distinct genus of over 80 species, confined mainly to Australia and New Zealand. There are outlying species in Timor and Lord Howe Islands. The 15 species found in New Zealand are all endemic. Several of them are exceedingly variable, and appear to be connected by intermediate forms, making their proper definition a matter of great difficulty. This is specially the case with *P. virgata*, *P. prostrata*, *P. Urvilleana*, and *P. Lyallii*, the numerous forms of which require a careful study in the field before their proper position can be determined.

The flowers of *Pimelea* are usually described as hermaphrodite. But all the New Zealand species are functionally dioecious, or occasionally polygamo-dioecious. The male flowers are the most numerous and the most conspicuous. The stamens have long slender filaments, so that the anthers either reach the top of the perianth-lobes or are slightly exserted; and the style with its comparatively small stigma is always included within the perianth. I have never seen fruit in this form, and believe that the pistil is quite functionless. The female flowers are smaller, often swollen at the base, although narrower above. The anthers are small, almost sessile, and are usually devoid of pollen. The ovary is large, with a short style and large capitate stigma, which is conspicuously exserted when the flower is mature. Pollen is sometimes present in this form, but in the majority of cases the flowers are strictly female.

A. Erect shrubs. Branches and leaves usually glabrous.

Leaves 1–3 in., broad or narrow lanceolate, flat. Flowers $\frac{1}{2}$ in. long .. .. 1. *P. longifolia.*
Leaves $\frac{1}{3}$–$\frac{3}{4}$ in., oblong or linear-oblong, often keeled. Flowers $\frac{1}{3}$–$\frac{1}{2}$ in. .. .. 2. *P. Gnidia.*
Leaves $\frac{1}{4}$–$\frac{1}{3}$ in., ovate or ovate-oblong, obtuse or subacute. Flowers $\frac{1}{3}$ in. .. .. 3. *P. Poppelwellii.*
Leaves uniform, $\frac{1}{5}$–$\frac{1}{4}$ in., densely quadrifariously imbricate .. 4. *P. Crosby-Smithiana.*
Leaves $\frac{1}{6}$–$\frac{1}{3}$ in., oblong or obovate-oblong, obtuse. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. .. .. 5. *P. Traversii.*

B. Erect or rarely procumbent shrubs. Branches pubescent or villous with silky hairs.

Leaves $\frac{1}{4}$–$\frac{1}{3}$ in., quadrifariously imbricate, oblong or elliptic, keeled, glabrous; floral often larger .. .. .. 6. *P. buxifolia.*
Leaves $\frac{1}{2}$–1 in., not imbricate, linear-lanceolate, flat, silky beneath .. .. 7. *P. virgata.*
Leaves $\frac{3}{4}$–1$\frac{1}{2}$ in., in distant pairs, broadly lanceolate, silky beneath .. .. 8. *P. Haastii.*
Leaves $\frac{1}{4}$–$\frac{1}{2}$ in., opposite and decussate, oblong or elliptic, under-surface clothed with appressed white silky hairs .. 9. *P. arenaria.*
Leaves smaller and narrower than above, otherwise very similar 10. *P. aridula.*

C. Prostrate or procumbent or rarely erect shrubs. Branches pubescent or villous with silky hairs.

Branches grey, pubescent or villous or glabrate. Leaves $\frac{1}{10}$–$\frac{1}{3}$ in., linear-oblong to obovate-oblong, usually glabrous 11. *P. prostrata.*
Branches with soft villous hairs. Leaves $\frac{1}{6}$–$\frac{1}{4}$ in., oblong, obtuse, glabrous .. .. 12. *P. Urvilleana.*
Branches tortuous, sparingly silky. Leaves $\frac{1}{3}$ in., narrow linear-lanceolate, surfaces glabrous, margins and apices ciliate 13. *P. Suteri.*
Branches silky. Leaves $\frac{1}{6}$–$\frac{1}{2}$ in., linear-oblong to elliptic-oblong, silky .. .. 14. *P. Lyallii.*
Branches densely silky-villous. Leaves $\frac{1}{8}$–$\frac{1}{4}$ in., linear-oblong to elliptic-oblong, very densely silky-villous on both surfaces 15. *P. sericeo-villosa.*

1. **P. longifolia** *Banks and Sol. ex Wikstr. in Vet. Akad. Handl. Stockh.* (1818) 280.—A small erect much-branched shrub 2–5 ft. high, perfectly glabrous except the inflorescence and sometimes a minute tuft of hairs at the tips of the young leaves; bark dark reddish-brown. Leaves crowded, opposite, spreading or suberect, 1–3 in. long, $\frac{1}{3}$–$\frac{3}{4}$ in. broad, oblong- or elliptic-lanceolate to lanceolate, acute or acuminate, narrowed into a very short petiole, coriaceous, flat, smooth, midrib and lateral veins distinct beneath; floral leaves similar or slightly broader. Flowers in compact many-flowered heads terminating the branches, sessile, sweet-scented, white or white tinged with rose, polygamo-dioecious. Receptacle villous. Perianth densely silky-villous; males the largest, $\frac{1}{2}$–$\frac{3}{4}$ in. long, with exserted anthers on slender filaments and a rather short style with small capitate stigma. Females smaller and narrower; anthers smaller, on short filaments, usually without pollen; style longer, with a larger capitate and papillose stigma. Fruit dry with a membranous epicarp, included in the swollen base of the perianth.—*Hook. f. Fl. Nov. Zel.* i (1853) 242; *Handb. N.Z. Fl.* (1864) 242; *Cheesem. Man. N.Z. Fl.* (1906) 609; *Ill. N.Z. Fl.* ii (1914) t. 172. Passerina longifolia *Thunb. Mus. Nat. Acad.* xiii, 106.

Var. **lanceolata.**—Leaves narrower, 1–2 in. long, $\frac{1}{6}$–$\frac{1}{4}$ in. broad, linear-lanceolate. Flowers smaller.—P. lanceolata *Col. in Trans. N.Z. Inst.* xxii (1890) 483 (*male*). P. similis *Col. l.c.* (*female*). P. angulata *Col. l.c.* xviii (1886) 265 (*a form with occasionally 3 or 4 stamens*).

North Island: Dry hills from the Bay of Islands to Cook Strait, but not plentiful. South Island: Admiralty Bay, *Banks* and *Solander;* mountains of Nelson, *W. T. L. Travers, F. G. Gibbs!* vicinity of Westport and at Charleston, *W. Townson!* Var. *lanceolata:* Base of Ruapehu, *H. Hill;* inland Patea, *A. Lascelles!* source of Ngaruroro River, *Petrie;* Pelorus Sound, *J. H. Macmahon! J. Rutland!* Sea-level to 3000 ft. *Taranga.* October–December.

A very handsome and attractive plant, easily distinguished from all the other species found in New Zealand by the glabrous habit, large leaves, and many-flowered heads of large white flowers. Its nearest ally is *P. Gnidia*, which differs mainly in the much smaller and frequently keeled leaves, and in the smaller flowers.

2. **P. Gnidia** *Willd. Sp. Plant.* i (1798) 50.—A stout erect much-branched shrub 1–5 ft. high, glabrous except the inflorescence and sometimes a tuft of silky hairs in the axils of the leaves; bark dark reddish-brown. Leaves close-set, opposite, shortly petioled, $\frac{1}{3}$–$\frac{3}{4}$ in. long, oblong or oblong-lanceolate or linear-oblong, usually acute at both ends, rigid and coriaceous, often slightly keeled by the prominent midrib, veinless, margins usually slightly thickened; floral similar or rather broader. Flowers in compact many-flowered heads terminating the branches, sessile, white or pale-rose, polygamo-dioecious. Perianth densely silky-villous, $\frac{1}{3}$–$\frac{1}{2}$ in. long. Anthers exserted. Style slender; stigma capitate, exserted. Fruit dry.—*A. Rich. Fl. Nouv. Zel.* (1832) 171; *A. Cunn. Precur.* (1838) n. 343; *Raoul Choix* (1846) 42; *Hook. f. Fl. Nov. Zel.* i (1853) 221; *Handb. N.Z. Fl.* (1864) 243; *Cheesem. Man. N.Z. Fl.* (1906) 609. Banksia Gnidia *Forst. Char. Gen.* (1776) 8, t. 4. Passerina Gnidia *Forst. f. Prodr.* (1786) n. 170. Cookia Gnidia *Gmel. Syst.* i (1791) 24.

Var. **pulchella.**—Robust. Leaves larger, $\frac{1}{2}$–1 in. long, elliptic-lanceolate or linear-obovate, acute or obtuse, not keeled, lateral veins often evident. Heads larger with more numerous flowers. Flowers almost as large as those of *P. longifolia.* Intermediate between *P. Gnidia* and *P. longifolia*, and with equal claims to be referred to either species.

North Island: Rocky peaks at Hihi, Kauaeranga River, Thames, *W. Townson!* Ruahine Mountains, *Colenso, B. C. Aston!* Tararua Mountains, *Petrie.* South Island: Marlborough and Nelson—Mount Stokes, Pelorus River, *J. H. Macmahon!* Torrent Bay, Sandy Bay, *R. J. Kingsley!* Maitai Valley, Wangapeka Valley, *T. F. C.*; Mount Rochfort, *W. Townson!* Otago—Dusky Bay, *Forster, Menzies, J. D. Enys!* Garvie Mountains, *Poppelwell.* Sea-level to 4000 ft. December–January.

Very close to *P. buxifolia*, but always to be distinguished by the glabrous branches.

3. **P. Poppelwelli** *Petrie in Trans. N.Z. Inst.* xlix (1917) 54.—An erect much-branched shrub 3–5 ft. high, glabrous except the inflorescence and sometimes a few hairs in the axils of the floral leaves; bark dark reddish-brown. Leaves dark-green, close-set, opposite, shortly petioled, $\frac{1}{4}$–$\frac{1}{3}$ in. long; broadly ovate or ovate-oblong, subacute, coriaceous, glabrous, more or less concave above, slightly keeled beneath, veinless; margins slightly thickened; floral leaves rather longer and broader, thinner, veined. Flowers in compact 8–12-flowered terminal heads, polygamo-dioecious, white or rose. Perianth densely silky-villous, $\frac{1}{3}$ in. long. Fruit unknown.

T. 75: 189

South Island: Otago—Garvie Mountains, Symmetry Peaks, Eyre Mountains, *Poppelwell!* Mount Cleughearn, *J. Crosby Smith!*

I have only seen two specimens of this plant. Apparently it only differs from *P. Gnidia* in its smaller, broader, and more obtuse leaves, and might well have been regarded as a variety of that species.

4. **Pimelea Crosby-Smithiana** *Petrie in Trans. N.Z. Inst.* xliv (1912) 186.—A low diffusely branched shrub, apparently not exceeding 1–3 ft. in height, glabrous except the inflorescence; branches stout, marked with the scars of the fallen leaves. Leaves closely quadrifariously imbricated, erecto-patent, concave above, sharply keeled beneath, $\frac{1}{5}$–$\frac{1}{4}$ in. long, $\frac{1}{8}$ in. broad, narrow oblong-ovate, acute, quite glabrous, thick and coriaceous, abruptly narrowed into a short thick petiole; margins thickened; floral leaves similar or rather broader. Flowers in 6–12-flowered terminal heads, small, sessile, polygamo-dioecious. Perianth densely silky-villous; tube equalling the leaves. Fruit not seen.

South Island: Otago—The Hump, alt. 3000 ft., between Lake Hauroko and the sea, *J. Crosby Smith!*

This belongs to the same section of the genus as *P. Gnidia*, but is amply distinct from that species and any other. The small uniform leaves, which are densely quadrifariously imbricate, give the plant a very different appearance to any other New Zealand species.

5. **P. Traversii** *Hook. f. Handb. N.Z. Fl.* (1864) 243.—A small very stout usually erect densely branched shrub 6–24 in. high; branches stout, often tortuous, prominently tubercled at the insertion of the fallen leaves, glabrous or slightly pubescent, usually with a tuft of silky hairs in the axils of the leaves; bark blackish-brown. Leaves closely quadrifariously imbricated, sessile, $\frac{1}{6}$–$\frac{1}{3}$ in. long, oblong or obovate-oblong to suborbicular, obtuse, thick and coriaceous, quite glabrous, midrib evident or obscure, veinless, margins often edged with red; floral leaves larger and broader, often twice or thrice as large, sometimes drying a peculiar verdigris-green. Flowers numerous, densely capitate, white or pinkish-white, polygamo-dioecious. Perianth densely silky-villous, $\frac{1}{4}$–$\frac{1}{3}$ in. long, the females shorter and broader than the males. Anthers in the male flowers almost reaching the top of the lobes, in the female flowers small and empty and on very short filaments. Ripe fruit not seen.—*Cheesem. Man. N.Z. Fl.* (1906) 610.

South Island: Nelson — Mount Rochfort, *W. Townson!* Mount Percival, *T. F. C.;* Lake Tennyson, *R. M. Laing.* Marlborough—Hell's Gates, Mason River, *H. J. Matthews!* Kaikoura Mountains, *Monro, Buchanan!* Canterbury—Hurunui River, *W. T. L. Travers;* Upper Waimakariri, *T. Kirk!* Mount Catherine, *Cockayne;* Ashburton Mountains, *Potts!* Rangitata Valley, *J. B. Armstrong!* Mount Peel, *H. H. Allan;* Mount Dobson, *T. F. C.;* Upper Tasman Valley, *Miss Linton!* Otago —Mount St. Bathan's, Mount Ida, *Petrie!*

In its ordinary state a distinct little species, easily recognized by the very robust habit, stout scarred and usually glabrous branches, small broad leaves, and numerous rather large flowers. Diffuse or almost prostrate forms, with slightly pubescent branches, show an approach to *P. laevigata.*

6. **P. buxifolia** *Hook. f. Handb. N.Z. Fl.* (1864) 243.—A small stout erect compactly branched shrub 1–5 ft. high; branches stout, densely clothed with coarse short greyish hairs; bark brownish-black, muricated. Leaves quadrifariously imbricated, shortly petioled, $\frac{1}{4}$–$\frac{3}{4}$ in. long, oblong-ovate or elliptic-oblong, acute or obtuse, coriaceous, glabrous, keeled, much wrinkled beneath, lateral veins conspicuous or obsolete, often verdigris-green when dry; floral leaves usually larger and broader. Flowers numerous, densely capitate, white or pink, polygamo-dioecious. Perianth silky-villous, $\frac{1}{4}$–$\frac{1}{3}$ in. long; females shorter and broader. Anthers in the male flowers on long filaments, almost reaching the top of the perianth-lobes; in the females minute, empty. Ripe fruit not seen.—*Cheesem. Man. N.Z. Fl.* (1906) 610; *Ill. N.Z. Fl.* ii (1914) t. 173. P. stylosa *Col. in Trans. N.Z. Inst.* xx (1888) 205. P. subsimilis *Col. l.c.* xxviii (1896) 609. P. montana *Col. l.c.* xxxi (1899) 279.

North Island: Mountains between the Kaiaeranga River and Tairua, *Adams! W. Townson!* Mount Hikurangi, *S. Dodgshun, Adams! Petrie!* slopes of Tongariro, Ngauruhoe, and Ruapehu, abundant, *Colenso, G. Mair! H. Hill! Spencer! T. F. C., Cockayne;* Ruahine Mountains, *Colenso, Petrie! A. Hamilton! H. Hill!* Kaweka Mountain, *Colenso;* Kaimanawa Mountains, *B. C. Aston!* 1500–4500 ft. December–March.

Very close to *P. Gnidia*, but easily distinguished by the branches being hirsute with coarse hairs. Hooker mentions the "evident lateral nerves" of the leaves as a good character, but I find that the leaves frequently have the veins very obscure.

P. tomentosa (Forst.) Bruce, 1916: 639

7. **P. virgata** *Vahl. Enum.* i (1804) 306. — A slender erect much-branched shrub 1–4 ft. high; branches long, slender, virgate, slightly ringed with the scars of the fallen leaves, younger ones more or less clothed with appressed silky hairs. Leaves spreading, close together or remote, not imbricate, almost sessile, $\frac{1}{2}$–1 in. long, linear-lanceolate, acute or acuminate, not coriaceous, flat, nerveless, usually glabrous above, pilose with appressed silky hairs beneath; floral leaves similar or occasionally larger and ovate-lanceolate. Flowers in compact 6–12-flowered heads at the tips of the branches, sometimes becoming axillary by the rapid growth of leafy shoots springing from beneath the heads. Perianth $\frac{1}{4}$–$\frac{1}{3}$ in. long, densely silky-villous; tube swollen at the base; lobes ovate, obtuse. Fruit usually baccate, white, ovoid-oblong, $\frac{1}{6}$–$\frac{1}{4}$ in. long, often hairy at the tip.—*A. Rich. Fl. Nouv. Zel.* (1832) 173; *A. Cunn. Prcur.* (1838) n. 345; *Raoul Choix* (1846) 42; *Hook. f. Fl. Nov. Zel.* i (1853) 220; *Handb. N.Z. Fl.* (1864) 243; *Cheesem. Man. N.Z. Fl.* (1906) 611. P. pilosa *Willd. Sp. Plant.* i (1798) 50. P. dichotoma *Col. in Trans. N.Z. Inst.* xxii (1890) 485. Passerina pilosa *Linn. f. Suppl.* (1781) 226; *Forst. f. Prodr.* (1786) n. 171.

North and South Islands: From the Three Kings Islands and the North Cape to Nelson and Marlborough. Sea-level to 2000 ft. September–December.

A common plant in the northern portion of the Dominion, well marked by the slender erect habit and rather lax lanceolate spreading leaves.

8. **P. Haastii** *T. Kirk in Trans. N.Z. Inst.* xii (1880) 396.—"A strict low-growing shrub 6–10 in. high; branches few (?), very slender, white with silky hairs. Leaves in distant pairs, petioled, ascending, narrow-lanceolate, $\frac{3}{4}$–$1\frac{1}{4}$ in. long, acute, hairy below or nearly glabrous, margins recurved; floral leaves similar. Flowers 5–8 in a head, very small; perianth swollen below, silky; lobes narrow, spreading. Filaments short. Style equalling the perianth-tube. Fruit not seen."

South Island: Alps of Canterbury, *Haast, J. B. Armstrong!*

Of this species I have only seen a single very fragmentary specimen in Mr. Kirk's herbarium, and have consequently quoted the original description. It appears to differ little from *P. virgata*, except in the more slender habit and distant rather longer and broader leaves.

9. **P. arenaria** *A. Cunn. in Bot. Mag.* (1833) t. 3270.—An erect or spreading or procumbent shrub 9–30 in. high; branches stout, strict, erect or ascending, simple or dichotomously or corymbosely branched above, densely clothed with long silvery white appressed silky hairs. Leaves opposite and decussate, close-set or remote, not usually imbricating, spreading or deflexed, $\frac{1}{4}$–$\frac{1}{2}$ in. long, elliptic-oblong to broadly oblong-ovate or almost orbicular, obtuse or subacute, flat, coriaceous, veinless, glabrous or sparsely pilose above, densely clothed with shining silky-appressed hairs beneath; floral leaves rather larger and broader. Flowers in compact 5–15-flowered heads at the tips of the branches, white, polygamo-dioecious. Perianth shaggy with white silky hairs, $\frac{1}{5}$–$\frac{1}{4}$ in. long; tube short; lobes oblong, obtuse; females smaller, with a broader base. Anthers oblong. Fruit baccate, rather large.—*A. Cunn. Precur.* (1838) n. 347; *Raoul Choix* (1846) 42; *Hook. f. Fl. Nov. Zel.* i (1853) 221; *Handb. N.Z. Fl.* (1864) 244; *Cheesem. Man. N.Z. Fl.* (1906) 612; *Ill. N.Z. Fl.* ii (1914) t. 174. Passerina villosa *Thunb. in Mus. Acad.* xiii, 106. Gymnococca arenaria *Fisch. and Mey. Ind. Sem. Hort. Petrop.* x (1845) 47.

North and South Islands, Chatham Islands: Abundant on sand-dunes on all the coasts. *Aute-taranga; Toroheke.* November–March.

A most beautiful plant, at once recognized by the copious white silky hairs on the branches and under-surface of the leaves. According to Mr. Colenso, the berries were formerly eaten by the Natives, who also used the inner bark of the branches for preparing cloth-like strips for fastening up their hair. T. 71 (1941) 188.

P. arenaria is practically confined to sand-dunes or sandy coasts. Its main stems are usually prostrate, and covered to a varying depth with sand; but from them arise numerous erect or inclined simple or corymbosely divided branches, which are seldom more than 2 ft. in height. A single plant may thus form a compact patch of considerable size. Like most of the species of *Pimelea*, the branches are tough, flexible, and cord-like.

10. **P. aridula** *Cockayne Veg. N.Z.* Index (1921) 356.—A small shrub 2–3 ft. high, spreading or decumbent at the base, erect above; branches marked with the scars of the fallen leaves, the young ones covered with long silvery white appressed hairs. Leaves opposite and decussate, spreading below, erecto-patent above, almost imbricating towards the tips of the branches, $\frac{1}{3}$–$\frac{1}{2}$ in. long, $\frac{1}{5}$–$\frac{1}{4}$ in. broad, elliptic-lanceolate to oblong-lanceolate, acute, very shortly petiolate or almost sessile; under-surface densely covered with long straight silvery hairs; upper surface glabrous or nearly so, but always pale greyish-white; margins thickened, clothed with long straight appressed hairs; floral leaves similar or rather broader. Flowers in 8–15-flowered heads terminating the

P laevigata Gaertn. var. montícola Kirk Trans 56 (1926) 11
P prostrata var. quadrigina Hook. f. Lond. J. Bot. 1844 iii : 416.

branchlets, white, polygamo-dioecious. Perianth shaggy with straight silky hairs, $\frac{1}{6}$–$\frac{1}{4}$ in. long. Fruit not seen.—P. Lyallii *var.* sericea *Cheesem. Man. N.Z. Fl.* (1906) 614.

Var. **linearis** *Cheesem. n. var.*—Leaves narrower, linear-lanceolate. Otherwise much as in the type.

North Island: Ruahine Mountains, *Colenso!* Hawke's Bay, *A. Hamilton!* South Island: Mount Peel, *H. H. Allan!* Otago—Kurow and other places in the Waitaki Valley, *Buchanan! Petrie!* Clutha Valley, *Petrie!* Crown Range and Cardrona, *T. Kirk!* Variety *linearis:* Near Kurow, *Cockayne!*

A very distinct little plant. In Kirk's herbarium it was placed as a variety of *P. virgata*, and in the Manual I transferred it to *P. Lyallii*. In the light of more numerous and better specimens I now consider it to be a distinct species, more nearly allied to *P. arenaria* than any other.

11. **P. prostrata** *Willd. Sp. Plant.* i (1798) 51.—A small prostrate or suberect much-branched shrub; branches scarred, stout or slender, long or short, from 4 or 6 in. to 2 ft. long; the younger ones usually more or less pubescent or sometimes glabrate, seldom white with villous hairs as in *P. Urvilleana;* bark dark-brown or reddish-brown. Leaves sometimes crowded and quadrifariously imbricate, at other times laxly placed, erect or spreading or deflexed, $\frac{1}{10}$–$\frac{1}{3}$ in. long, lanceolate or linear-oblong to elliptic-oblong or obovate-oblong, obtuse or acute, flat or concave, nerveless or the midrib prominent beneath, usually glabrous on both surfaces; floral leaves rather larger and broader. Flowers in few- or many-flowered heads at the tips of the branches, small, white, polygamo-dioecious. Perianth $\frac{1}{8}$–$\frac{1}{4}$ in. long, more or less silky-villous or pilose, the females smaller and narrower than the males. Fruit usually baccate, white, ovoid, acute.—*A. Rich. Fl. Nouv. Zel.* (1832) 174; *A. Cunn. Precur.* (1838) n. 346; *Raoul Choix* (1846) 42; *Hook. f. Fl. Nov. Zel.* i (1853) 220; *Handb. N.Z. Fl.* (1864) 244. Cookia prostrata *Gmel. Syst.* (1791) 24. Passerina prostrata *Forst. f. Prodr.* (1786) n. 172. Banksia prostrata *Forst. Char. Gen.* (1776) n. 3. P. laevigata *Gaertn. Fruct.* i (1788) 186, t. 39, f. 1; *Cheesem. Man. N.Z. Fl.* (1906) 612. P. rugulosa *Col. in Trans. N.Z. Inst.* xxi (1889) 102. P. microphylla, P. bicolor, *and* P. heterophylla *Col. l.c.* xxii (1890) 484–86.

Var. **erecta.**—Stems stout, erect or suberect. Heads usually many-flowered.

Var. **repens.**—Stems more slender, procumbent or prostrate, often very diffusely branched. Flowers fewer and smaller.

Var. **alpina.**—Stems stout, suberect or spreading, branches tortuous, scarred, often nearly glabrous.

North and South Islands: From the Three Kings Islands and the North Cape southwards to the Bluff, abundant. Sea-level to 4500 ft. October–March.

An almost polymorphous plant, the various forms of which are much in need of careful study and comparison. In the first edition of this work I accepted Gaertner's name of *Pimelea laevigata*, published in 1788, that being the oldest name under the correct genus. But now that the Vienna Conference has decided that the oldest specific name under any genus is to have priority it is necessary to fall back upon the Forsters' name of *prostrata*, published (under *Banksia*) in 1776 in their "Characteres Generum Plantarum."

12. **P. Urvilleana** *A. Rich. Fl. Nouv. Zel.* (1832) 175.—A small widely spreading rather laxly branched procumbent shrub; branches 4–18 in. long, scarred, the younger ones white with copious short appressed silky hairs. Leaves close-set, usually quadrifariously imbricating, spreading

* Murray Syst. Veg.

or deflexed, $\frac{1}{6}$–$\frac{1}{4}$ in. long, linear-oblong to oblong or oblong-ovate, obtuse or subacute, thick and coriaceous, concave, nerveless, usually glabrous on both surfaces; floral leaves usually larger and broader. Flowers in 4–8-flowered heads at the tips of the branches, small, white. Perianth $\frac{1}{6}$–$\frac{1}{5}$ in. long, villous with long white hairs; lobes equalling the tube, broadly oblong, obtuse. Fruit baccate, white.—*A. Cunn. Precur.* (1838) n. 348; *Raoul Choix* (1846) 42; *Hook. f. Fl. Nov. Zel.* i (1853) 221; *Handb. N.Z. Fl.* (1864) 244; *Cheesem. Man. N.Z. Fl.* (1906) 613. P. prostrata *var.* Urvilleana *Meisn. in DC. Prodr.* xiv (1856) 517. Gymnococca microcarpa *Fisch. and Mey. Ind. Sem. Hort. Petrop.* x (1845) 47.

North Island: Usually near the sea. Bay of Islands, *Cunningham;* Whangarei Heads, Great Barrier Island, *T. Kirk!* Little Barrier Island, *T. F. C.;* vicinity of Auckland, *Colonel Haultain!* Taranaki, *Dieffenbach.* South Island: Nelson—Tasman Bay, *D'Urville;* coast near Charleston, *Petrie!* October–March.

A very imperfectly understood species, apparently only differing from states of *P. prostrata* in the copious snow-white hairs on the young branches.

13. **P. Suteri** *T. Kirk in Trans. N.Z. Inst.* xxvi (1894) 259.—A small much-branched shrub 4–12 in. high; branches spreading or suberect, often tortuous; the younger ones sparingly pilose with rather long straight silky hairs; bark dark red-brown or black. Leaves crowded, shortly petiolate or nearly sessile, erecto-patent, about $\frac{1}{3}$ in. long, narrow linear-lanceolate, subacute, coriaceous, concave above, both surfaces glabrous or rarely with a few lax hairs, margins and apices ciliated with long straight hairs. Flowers in 4–8-flowered heads at the tips of the branches, white, polygamo-dioecious. Perianth $\frac{1}{4}$–$\frac{1}{3}$ in. long, villous with white hairs. Fruit baccate, red, ovoid, acute, hairy at the tip.—*Cheesem. Man. N.Z. Fl.* (1906) 613; *Ill. N.Z. Fl.* ii (1914) t. 175.

South Island: Nelson—Dun Mountain Range, *Monro! W. T. L. Travers! P. Lawson! R. J. Kingsley! F. G. Gibbs! T. F. C.* 2500–4000 ft.

P. Suteri is allied to *P. prostrata* and *P. Lyallii*, but differs from both in its peculiar habit, and in the much narrower leaves, which have their margins and apices ciliate with long hairs. Up to the present time it has not been found except on the Dun Mountain Range, where it is not uncommon.

14. **P. Lyallii** *Hook. f. Fl. Nov. Zel.* i (1853) 222.—A small stout prostrate or suberect much-branched shrub 6–18 in. high; branches sometimes long, spreading or trailing, at other times shorter, ascending or erect; the younger ones more or less silky-pilose with appressed hairs, rarely almost glabrous; bark dark red-brown. Leaves usually close-set, erect or patent, $\frac{1}{6}$–$\frac{1}{2}$ in. long, linear-oblong or elliptic-oblong or lanceolate, acute or acuminate, concave, nerveless, glabrous above or nearly so, silky with long hairs beneath or almost glabrate; floral leaves similar to the others. Flowers in 4–12-flowered heads at the tips of the branches, white. Perianth about $\frac{1}{4}$ in. long, densely silky-villous; lobes ovate-oblong, obtuse. Anthers short, oblong.—*Handb. N.Z. Fl.* (1864) 245; *Cheesem. Man. N.Z. Fl.* (1906) 614.

North Island: Ruahine Mountains, *Colenso! Tryon! A. Hamilton!* South Island, Stewart Island: Abundant in mountain districts throughout. Usually from 2000 to 4000 ft., but descends to sea-level in the south of Otago. December–March.

An exceedingly puzzling plant. Perhaps nearest to *P. prostrata*, from which it can generally be distinguished by the more or less silky leaves and branchlets. When slender and more erect it approaches some states of *P. virgata*, but the habit is altogether different. *P. sericeo-villosa* is at once separated by the larger broader leaves, densely clothed with long silky hairs.

15. **P. sericeo-villosa** *Hook. f. Handb. N.Z. Fl.* (1864) 245.—A much-branched prostrate shrub, forming compact depressed patches 3–18 in. across, everywhere densely villous with long pale silky hairs; branchlets short, stout, densely leafy. Leaves crowded, closely imbricating, erect, $\frac{1}{8}$–$\frac{1}{4}$ in. long, linear-oblong or elliptic-oblong, obtuse or acute, concave, both surfaces villous with long straight hairs, which usually completely conceal the leaf. Flowers in 2–6-flowered heads at the tips of the branches, white. Perianth $\frac{1}{6}$–$\frac{1}{5}$ in. long, densely silky-villous; lobes ovate-oblong, obtuse.—*Cheesem. Man. N.Z. Fl.* (1906) 614. T. 75(1945), 89.

South Island: Marlborough—Mount Duppa, *J. H. Macmahon!* Awatere Valley, *Cockayne, Monro.* Nelson—Wairau Mountains, *W. T. L. Travers;* Jollie's Pass, *Haast! T. F. C.;* Clarence Valley, *T. F. C.* Canterbury—Lake Tekapo and Mackenzie Plains, *T. F. C.* Otago—Waitaki Valley, *Hector* and *Buchanan!* Clutha Valley from Cromwell to Lake Wanaka and Lake Hawea, *Petrie!* Ben Lomond, Lake Wakatipu, *B. C. Aston;* Garvie Mountains, *Poppelwell.*

A distinct little species, differing from *P. Lyallii* in its more completely prostrate and often densely compacted habit, and in the far more copious covering of long straight silky hairs.

2. **DRAPETES** Banks. 1792.

Small prostrate spreading or densely tufted shrubby plants. Leaves small, alternate, imbricate, concave. Flowers hermaphrodite or polygamo-dioecious, sessile in small terminal heads. Perianth tubular or funnel-shaped; lobes 4, spreading; throat usually furnished with 1 or 2 scales opposite each lobe, rarely naked. Stamens 4, inserted on the throat of the perianth and alternate with its lobes; filaments short, filiform; anthers oblong. Hypogynous scales wanting. Ovary sessile, 1-celled; style long; stigma capitate; ovule solitary, pendulous. Fruit a small drupe; epicarp thin, fleshy; endocarp crustaceous. Seed pendulous, cotyledons broad, thick.

A small genus of 5 species, found in Fuegia, New Zealand, Australia, New Guinea, and Borneo. The New Zealand species are endemic.

Branches glabrous or slightly villous. Leaves $\frac{1}{10}$–$\frac{1}{6}$ in., linear or linear-ligulate. Male perianth funnel-shaped. Scales 4, entire or 2-lobed, or 8 in very closely approximate pairs	1. *D. Dieffenbachii.*
Branches densely villous. Leaves $\frac{1}{6}$–$\frac{1}{4}$ in., linear-subulate, broadest at the base. Male perianth funnel-shaped. Scales 8, in distinct pairs	2. *D. villosa.*
Branches closely compacted. Leaves $\frac{1}{12}$–$\frac{1}{10}$ in., ovate-oblong, subacute. Male perianth almost campanulate. Scales 8, in distinct pairs	3. *D. Lyallii.*

Fruiting specimens of a *Drapetes* found on Mount Sinclair, Banks Peninsula, have been identified by Dr. Berggren with the Australian and Tasmanian *D. tasmanica* Hook. f., but I have seen no specimens. According to Bentham, it is very close to *D. Dieffenbachii*, principally differing in the smaller and more hairy perianth, the lobes of which are as long as the tube.

1. **D. Dieffenbachii** *Hook. in Lond. Journ. Bot.* ii (1843) 497, t. 17.—A small creeping and rooting much-branched plant; stems woody at the base, 3–12 in. long; branches stout or slender, scarred, ascending at the tips, glabrous or slightly villous with short white hairs. Leaves usually close-set and imbricating, but sometimes distant on barren shoots, sub-erect, often incurved at the tips, $\frac{1}{10}$–$\frac{1}{6}$ in. long, linear or lin ar-ligulate, obtuse, concave in front, convex on the back, grooved or striate or almost

smooth, glabrous or nearly so when old, but the upper ½ of the margins and the apex ciliate when young. Flowers small, polygamo-dioecious, in 3–8-flowered heads at the tips of the branches, sunk amongst the uppermost leaves. Male perianth about $\frac{1}{6}$ in. long, funnel-shaped, the lobes about ⅓ the length of the tube. Scales very variable, sometimes a single entire one at the base of each lobe, but more often the scale is 2-lobed or divided to the base into 2 distinct but closely approximate scales. Stamens with long slender filaments, the anthers almost reaching the top of the lobes. Ovary and style very small, abortive. Female (or hermaphrodite) perianth smaller and broader. Anthers much smaller, usually empty, on shorter filaments. Ovary large, densely villous at the tip; style long; stigma capitate, exserted. Fruit small, ovoid.—*Raoul Choix* (1846) 42; *Hook. f. Fl. Nov. Zel.* i (1853) 222; *Handb. N.Z. Fl.* (1864) 245; *Cheesem. Man. N.Z. Fl.* (1906) 645. D. macrantha *Col. in Trans. N.Z. Inst.* xxii (1890) 487. Kelleria Dieffenbachii *Endl. Gen. Suppl.* iv (1847) 61; *Meisn. in DC. Prodr.* xiv (1856) 566.

Var. **laxa** *Cheesem.*—Pale-green, more laxly branched. Leaves larger, spreading or ascending, $\frac{1}{6}$–$\frac{1}{4}$ in. long, linear-oblong, obtuse, rather thin, almost flat, conspicuously nerved, ciliate on the margins and back. Heads 3–8-flowered. Perianth-lobes almost equalling the tube; scales 8, small. Perhaps a distinct species.

North and South Islands, Stewart Island: Common in mountain districts from Moehau (Cape Colville) and Hikurangi southwards. Var. *laxa:* Ruahine Mountains, *Tryon!* Nelson—Mountains flanking the Wairau Valley, *T. F. C.;* Mount Murchison, *W. Townson!* 2000–4500 ft. December–March.

A very variable plant, which does not seem to be separated by any definite characters from the following species. The var. *laxa* may prove distinct, but it requires further study with a larger suite of specimens than has yet been obtained.

2. **D. villosa** *Cheesem.*—Very similar in most of its characters to *D. Dieffenbachii*, but usually a more robust plant, with the branchlets more or less villous with greyish hairs, and with slightly larger leaves that are somewhat broader at the base, and have the margins and frequently the back ciliate to the base. Flowers in 3–4-flowered heads at the tips of the branches, similar to those of *D. Dieffenbachii*, but the glands always 8.—Kelleria villosa *Berggren in Minnesk. Fisiog. Sallsk. Lund.* (1877) 18, t. 5, f. 1–15.

Var. **multiflora.**—Leaves longer, strict, ascending, $\frac{1}{5}$–$\frac{1}{4}$ in. long, narrow linear-lanceolate, tapering from the base to an obtuse tip, slightly convex on the back, conspicuously 5-nerved; margins ciliate with long straight hairs and with a pencil of hairs at the apex. Flowers in 5–12-flowered heads at the tips of the branches. Glands 8, very small.

South Island: Mountain districts in Nelson, Canterbury, and Otago, apparently not uncommon. Var. *multiflora:* Nelson—Mount Arthur Plateau, *T. F. C.;* Mount Faraday, *W. Townson!* Lake Tennyson, *R. M. Laing.* Canterbury—Candlestick Mountains, Mount Oxford, *Cockayne!* Mount Torlesse, *T. F. C.* Westland—Kelly's Hill, *Petrie!* 2500–4500 ft. December–March.

Not at all a satisfactory species. The var. *multiflora* agrees in the villous branches, but differs in a marked degree in the longer, strict, strongly nerved leaves, and more numerous flowers. All the forms of *villosa* and *Dieffenbachii* are much in need of a careful revision.

3. **D. Lyallii** *Hook. f. Fl. Nov. Zel.* ii (1855) 336.—A compactly branched moss-like plant, usually forming dense patches 1–4 in. diam.; branches short, erect or ascending. Leaves very densely imbricate, usually

erect, $\frac{1}{12}$–$\frac{1}{10}$ in. long, narrow-ovate or ovate-oblong or ovate-subulate, broadest at the base and then tapering gradually to an acute or subacute tip, convex and smooth on the back, not prominently nerved, apex and margins ciliate. Flowers small, polygamo-dioecious, solitary or 2–3 together at the tips of the branches. Male perianth $\frac{1}{10}$–$\frac{1}{8}$ in. long, broadly funnel-shaped or almost campanulate; lobes about as long as the tube, oblong-ovate, each with 2 glands at the base. Stamens with slender filaments; anthers almost reaching the top of the lobes. Ovary small, with a very short style. Female perianth (or hermaphrodite) smaller and rather broader, $\frac{1}{12}$–$\frac{1}{10}$ in. long. Anthers very small, usually empty, on very short filaments. Ovary ciliate at the top; style long, stout; stigma capitate, exserted.—*Handb. N.Z. Fl.* (1864) 246; *Cheesem. Man. N.Z. Fl.* (1906) 616. D. muscosa *Hook. f. Fl. Nov. Zel.* i (1853) 223 (*not of Lam.*). Kelleria Dieffenbachii *var.* Lyallii *Meisn. in DC. Prodr.* xiv (1856) 566.

South Island: Nelson—Wairau Gorge, *T. F. C.*; Mount Owen, *T. F. C.*; Waiau Valley, *W. T. L. Travers.* Canterbury—Southern Alps, *Sinclair* and *Haast, J. B. Armstrong.* Otago—Lake district, *Hector* and *Buchanan!* Dunstan Mountains, Hector Mountains, Mount Pisa, Mount Cardrona, &c., *Petrie!* Eyre Mountains and Garvie Mountains, *Poppelwell.* Stewart Island: *Lyall, T. Kirk!* 4000–6500 ft. December–March.

A well-marked species, at once recognized by the compact habit, small ovate-oblong or ovate-lanceolate leaves, and broad almost campanulate perianth.

Family LXXIII. **MYRTACEAE.**

Trees or shrubs, sometimes climbing. Leaves opposite, more rarely alternate or whorled, simple and entire, usually dotted with pellucid oil-glands and with a vein running parallel to the margin. Stipules generally absent. Flowers regular, usually hermaphrodite, solitary and axillary, or in axillary or terminal cymes, panicles, or racemes. Calyx-tube adnate to the ovary up to the insertion of the stamens, limb 4–5 or many-cleft or -partite, persistent or deciduous, imbricate or valvate, sometimes entire or closed in bud. Petals as many as the calyx-lobes, rarely wanting, inserted on a disc lining the calyx-tube. Stamens usually numerous, inserted on the disc with the petals; filaments free or connate at the base or united into separate bundles; anthers small, roundish. Ovary inferior or semi-inferior, crowned by a fleshy disc, sometimes 1-celled with 1 or few ovules, more often 2- to many-celled with numerous ovules; style simple; stigma capitate. Fruit either crowned by the persistent calyx-limb or marked by its scar when deciduous, usually a capsule loculicidally dehiscing into as many valves as cells, or a 1- to many-seeded berry, more rarely dry and indehiscent. Seeds angular or compressed or cylindrical; albumen usually wanting.

A very large and distinct family, readily recognized by the opposite exstipulate entire leaves, furnished with a marginal vein, and filled with transparent oil-glands. The species are mainly tropical or subtropical; most abundant in South America and Australia, much less common in Asia and Africa; more frequent in the South Temperate Zone than in the North, where they are decidedly rare. Genera about 80; species probably not exceeding 1800. The family includes many plants of economic importance. Some produce valuable spices, as cloves, allspice; or edible fruits, as the guava, the rose-apple, brazil-nuts, &c.; others yield aromatic essential oils, as eucalyptus, cajeput, &c. The bark of most of the species is more or less astringent. Some of the species of *Eucalyptus* attain a height of over 400 ft., being probably the tallest trees in the world.

Of the four New Zealand genera, *Leptospermum* extends through Australia as far as the Malay Archipelago; *Metrosideros* occurs in the Pacific and Malayan islands, Australia, and South Africa: *Eugenia* is mainly tropical; and *Myrtus* mostly American.

* Fruit capsular.

Leaves small, alternate.	Flowers solitary or fascicled	1. LEPTOSPERMUM.
Leaves larger, opposite.	Flowers usually handsome, cymose ..	2. METROSIDEROS.

** Fruit a berry.

Flowers usually solitary.	Embryo curved, with a long radicle ..	3. MYRTUS.
Flowers cymose.	Embryo thick and fleshy, radicle short ..	4. EUGENIA.

1. **LEPTOSPERMUM** Forst. 1776.

Shrubs or small trees, glabrous or silky-pubescent. Leaves small, alternate, entire. Flowers solitary or 2–3 together, axillary or at the ends of the branchlets, often polygamous. Calyx-tube campanulate or turbinate, adnate to the ovary below; lobes 5. Petals 5, spreading. Stamens numerous, free, in a single series; anthers versatile. Ovary inferior or half-superior, enclosed in the calyx-tube, 5- or more-celled, rarely 3–4-celled; style filiform; stigma capitate or peltate. Capsule woody or coriaceous, exceeding the calyx-tube or altogether included in it, opening loculicidally at the top. Seeds numerous in each cell, but most of them sterile, pendulous, linear or angular.

A genus of about 28 species, almost wholly Australian; a few only in New Zealand, New Caledonia, and the Malay Archipelago. One of the New Zealand species is also found in Australia, the remaining two are endemic.

Leaves pungent. Flowers $\frac{1}{3}$–$\frac{1}{2}$ in. diam., solitary. Calyx-lobes deciduous. Capsule half-exserted	1. *L. scoparium.*
Leaves not pungent. Flowers $\frac{1}{5}$ in. diam., usually fascicled. Calyx-lobes persistent. Capsule included in the calyx-tube	2. *L. ericoides.*
Leaves not pungent, white with silky hairs. Flowers $\frac{1}{4}$ in. diam. Calyx-lobes persistent. Capsule deeply sunk within the calyx-tube	3. *L. Sinclairii.*

1. **L. scoparium** *Forst. Char. Gen.* (1776) 72, t. 36.—A shrub or small tree, extremely variable in size, usually 6–18 ft. high, but sometimes dwarfed to a foot or two, occasionally reaching 20–25 ft. with a trunk 12–18 in. diam.; branches fastigiate or spreading; branchlets and young leaves silky. Leaves $\frac{1}{6}$–$\frac{1}{2}$ in. long, variable in shape, linear or linear-lanceolate to broadly ovate, sessile, rigid, concave, acute and pungent-pointed, veinless, dotted, erect or spreading, rarely recurved. Flowers sessile, solitary, axillary or terminating the branchlets, $\frac{1}{4}$–$\frac{1}{2}$ in. diam. Calyx-tube broadly turbinate; lobes orbicular, deciduous. Petals orbicular, slightly clawed. Capsule woody, persistent, half sunk in the calyx-tube, which forms a rim round it, the free portion 5-valved.—*A. Rich. Fl. Nouv. Zel.* (1832) 337; *A. Cunn. Precur.* (1839) n. 553; *Raoul Choix* (1846) 49; *Hook. f. Fl. Nov. Zel.* i (1853) 69; *Handb. N.Z. Fl.* (1864) 69; *T. Kirk Forest Fl.* (1889) t. 117; *Students' Fl.* (1899) 157; *Cheesem. Man. N.Z. Fl.* (1906) 160.

Var. **incanum** *Cockayne in Trans. N.Z. Inst.* xlix (1917) 58.—Leaves lanceolate or linear-lanceolate, $\frac{1}{4}$–$\frac{1}{3}$ in. long, hoary when young with silky whitish hairs. Flowers rather larger than in the type, usually rose-coloured.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout, ascending to 4500 ft. *Manuka; Tea-tree.* October–April. Also plentiful in Australia and Tasmania.

One of the most widely distributed plants in the Dominion, found in almost all soils and situations. In the northern half of the North Island it is the dominant species over large areas of poor clay soils, and having been "burnt off" time after time by the diggers of kauri-gum in order to facilitate their operations, in many districts now forms an open heath-like vegetation from 5 to 10 ft. high, often stretching for many miles. When left alone, this gradually develops into a taller growth, reaching a height of 15 to 25 ft. Finally, by the gradual appearance of young forest-trees among the *Leptospermum* the beginning of a mixed-forest growth is seen, which ultimately supersedes the *Leptospermum*.

L. scoparium is an exceedingly variable plant. Hooker, in his "Flora Novae-Zelandiae," characterized 4 varieties; but I agree with Dr. Cockayne that these do not constitute permanent forms. Of late several red-flowered varieties have been detected, and are now commonly cultivated; as also a form with double white flowers.

2. **L. ericoides** *A. Rich. Fl. Nouv. Zel.* (1832) 338.—A shrub or tree 20–60 ft. high, with a trunk 1–3 ft. diam.; bark loose, papery; branchlets slender, glabrous or the younger sparingly silky. Leaves fascicled or alternate, $\frac{1}{6}$–$\frac{1}{2}$ in. long, very narrow-linear or linear-lanceolate, sometimes narrow linear-spathulate, acute but not pungent, concave, veinless, dotted, glabrous or slightly silky; margins often ciliate when young. Flowers $\frac{1}{8}$–$\frac{1}{4}$ in. diam., axillary, solitary or fascicled, usually produced in great profusion; pedicels short, glabrous or silky. Calyx-tube turbinate; lobes ovate, acute, persistent. Petals orbicular, shortly clawed. Capsule small, turbinate, wholly included within the calyx-tube.—*A. Cunn. Precur.* (1839) n. 554; *Raoul Choix* (1846) 49; *Hook. f. Fl. Nov. Zel.* i (1853) 70; *Handb. N.Z. Fl.* (1864) 70; *T. Kirk Forest Fl.* (1889) t. 69; *Students' Fl.* (1899) 158; *Cheesem. Man. N.Z. Fl.* (1906) 161.

Var. **lineatum** *T. Kirk Students' Fl.* (1899) 158.—Smaller and more slender, 2–12 ft. high, usually more silky. Leaves narrower, $\frac{1}{30}$–$\frac{1}{20}$ in. broad. Flowers smaller, $\frac{1}{8}$ in. diam.—L. lineatum *Cockayne in Report on Dune Areas of N.Z.* (1911) 38.

North and South Islands: Abundant from the North Cape to the Bluff, ascending to 3000 ft. Var. *lineatum*, from the North Cape to the Auckland Isthmus. *Kanuka; Maru.* November–January.

Easily distinguished from the preceding by its greater size, narrower leaves, smaller flowers, and much smaller capsules, which are entirely included in the calyx-tube. Wood durable; much used for piles, house-blocks, posts and rails, &c.

3. **L. Sinclairii** *T. Kirk Students' Fl.* (1899) 158.—A small prostrate or suberect shrub 1–5 ft. high; branches spreading; young shoots, leaves, pedicels, and calyces hoary with appressed silky hairs. Leaves $\frac{1}{4}$–$\frac{1}{2}$ in. long, linear-lanceolate or oblong-lanceolate, acute, flat or concave. Flowers larger than in *L. ericoides*, $\frac{1}{4}$ in. diam., on longer pedicels, often crowded towards the ends of the branchlets, forming rounded heads. Calyx-tube narrow-turbinate; lobes oblong or ovate, acute or obtuse, persistent. Petals obovate, clawed. Capsule narrow-turbinate, more deeply sunk within the calyx-tube than in *L. ericoides.*—*Cheesem. Man. N.Z. Fl.* (1906) 161; *Ill. N.Z. Fl.* i (1914) t. 47.

North Island: Three Kings Islands, *T. F. C.*; Great Barrier Island, *Hutton* and *T. Kirk!* Sea-level to 1800 ft. November–January.

This is very close to *L. ericoides*. Its distinguishing characters are the smaller size, broader and flatter silky-hoary leaves, larger flowers, and more deeply sunk capsules.

2. **METROSIDEROS** Banks.

Erect or climbing trees or shrubs. Leaves opposite, sometimes distichous especially in the young climbing branches, coriaceous. Flowers often handsome, white or red or crimson, usually disposed in terminal cymes or racemes. Calyx-tube adnate to the base of the ovary, campanulate, turbinate or urceolate; lobes 5, imbricate. Petals 5, spreading. Stamens very numerous, much longer than the petals; filaments filiform; anthers versatile. Ovary inferior or half-superior, 3-celled; style filiform; stigma small; ovules numerous in each cell. Capsule coriaceous, altogether enclosed in the persistent calyx-tube or protruding beyond it, 3-celled, loculicidally 3-valved or irregularly dehiscent. Seeds numerous, densely packed, linear; testa membranous.

In addition to the 11 species found in New Zealand, all but one of which are endemic, there are a few scattered through Polynesia, New Caledonia, Australia, and the Malay Archipelago, together with an aberrant species in South Africa. New Zealand is the only country which possesses climbing species.

* Capsule coriaceous or woody, wholly enclosed in the calyx-tube, which is produced far beyond it, dehiscing irregularly or by 3 apical valves.

Climbing. Leaves obtuse. Calyx glabrous. Capsule large, $\frac{1}{2}$–$\frac{3}{4}$ in.	1. *M. florida.*
Erect, 30–60 ft. Leaves elliptic-lanceolate, acute or acuminate. Calyx silky. Capsule $\frac{1}{3}$ in.	2. *M. lucida.*
A much-branched shrub. Leaves ovate-lanceolate, acute. Cymes usually on the old wood below the leaves	3. *M. Parkinsonii.*

** Capsule hardly coriaceous, wholly enclosed in the calyx-tube, which is produced far beyond it, dehiscing to the base. All climbers.

Leaves decussate, large $1\frac{1}{2}$–3 in., acute or acuminate. Flowers large, white, terminal	4. *M. albiflora.*
Leaves decussate, smaller, $\frac{3}{4}$–$1\frac{1}{2}$ in., obtuse. Flowers crimson ..	5. *M. diffusa.*
Leaves distichous, subacute. Branchlets glabrescent. Flowers always lateral	6. *M. hypericifolia.*
Leaves distichous, acuminate. Branchlets pubescent. Flowers usually terminal	7. *M. Colensoi.*

*** Capsule exserted beyond the calyx-tube, the free portion 3-valved.

Erect. Leaves decussate, glabrous, obtuse, 1–$1\frac{1}{2}$ in. long ..	8. *M. robusta.*
Erect. Leaves decussate, white with appressed tomentum beneath, 2–4 in. long	9. *M. tomentosa.*
Erect. Leaves decussate, white with appressed tomentum beneath, $\frac{3}{4}$–2 in. long	10. *M. villosa.*
Climbing. Leaves distichous, $\frac{1}{3}$–$\frac{1}{2}$ in. long. Flowers white ..	11. *M. scandens.*

1916 : 635.

1. **M. florida** *Sm. in Trans. Linn. Soc.* iii (1797) 269.—Usually a tall woody climber, reaching the tops of lofty trees; stems long, cable-like, often 3–6 in. diam.; bark loose, separating in large flakes. Leaves $1\frac{1}{2}$–3 in. long, shortly petioled, elliptic-oblong, obtuse, coriaceous, glabrous; midrib stout. Flowers orange-red, in few- or many-flowered terminal simple or branched cymes. Calyx obconic or turbinate, glabrous, produced beyond the ovary. Petals orbicular, yellowish-red. Stamens scarlet, very numerous, $\frac{3}{4}$–1 in. long. Ovary completely adnate with the base of the calyx-tube, 3-celled. Capsule deeply sunk within the persistent calyx, and with it forming a woody urceolate 5-ribbed fruit $\frac{1}{2}$–$\frac{3}{4}$ in. long, usually dehiscing by 3 valves within the calyx.—*A. Rich. Fl. Nouv. Zel.* (1832) 333; *A. Cunn. Precur.* (1839) n. 559; *Raoul Choix* (1846) 49; *Hook. f. Fl. Nov. Zel.* i (1853) 66, t. 15; *Handb. N.Z. Fl.* (1864) 70; *T. Kirk Forest*

T. 71 (1941) 88.

N. Z. SPECIES OF METROSIDEROS

New names from paper by Dr. W.R.B. Oliver, T.N.Z.I.Vol.59 p.439

CHEESEMAN	PRESENT
M.florida (Aka(	M. scandens (Forst.) Druce.
M. lucida (Southern Rata)	M. umbellata Cav.
M. Parkinsonii	M. Parkinsonii Buch.
M. albiflora	M. albiflora Sol. ex Gaertn.
M. diffusa	M. carminea W.R. Oliv. new name
M. hypericifolia	M. diffusa (Forst) W.R. Oliv.
M. Colensoi	M. Colensoi, Hook.f.
M. scandens (Aka-kura)	M½ perforata (Forst.) Rich.
M. robusta (Rata)	M. robusta, A. Cunn.
M. robusta var. intermedia	X M. subtomentosa, Carse
M. tomentosa (Pohutukawa)	M. excelsa, Sol. ex Gaertn.
M. villosa (Kermadec Is.Pohutukawa)	M. Kermadecensis, W.R.Oliv.

Further notes on Metrosideros by Cockayne & Allan
T.N.Z.I. vol. 56 pp. 5 & 27

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crimson, usually in dense paniculate cymes springing from the branches below the leaves, but sometimes terminating the branchlets as well. Calyx-tube turbinate, glabrous; lobes 5, ovate, triangular, obtuse. Stamens 1 in. long. Ovary sunk in the calyx-tube, 3-celled. Capsule ¼ in. long, coriaceous, broadly campanulate, obscurely 5-ribbed, crowned by the persistent cup-shaped calyx-limb.—*T. Kirk Students' Fl.* (1899) 160; *Cheesem. Man. N.Z. Fl.* (1906) 163; *Ill. N.Z. Fl.* i (1914) t. 49.

and with it forming a woody urceolate 5-ribbed fruit $\frac{1}{2}$–$\frac{3}{4}$ in. long, usually dehiscing by 3 valves within the calyx.—*A. Rich. Fl. Nouv. Zel.* (1832) 333; *A. Cunn. Precur.* (1839) n. 559; *Raoul Choix* (1846) 49; *Hook. f. Fl. Nov. Zel.* i (1853) 66, t. 15; *Handb. N.Z. Fl.* (1864) 70; *T. Kirk Forest*

T. 71 (1941) 88.

Fl. (1889) t. 127; *Students' Fl.* (1899) 160; *Cheesem. Man. N.Z. Fl.* (1906) 162. M. speciosa *Col. in Trans. N.Z. Inst.* xxii (1890) 463. M. aurata *Col. l.c.* xxiii (1891) 385. Leptospermum scandens *Forst. Char. Gen.* (1776) 72.

North Island: Abundant from the Three Kings Islands and the North Cape southwards to Cook Strait. South Island: Marlborough—Queen Charlotte Sound, *J. H. Macmahon!* Nelson—Vicinity of Nelson, *T. F. C.*; Collingwood, *T. Kirk! Buchanan!* Westland—Common as far south as the Waiho River, in lowland forest, *Cockayne*; Martin's Bay, *Poppelwell, W. A. Thomson!* Sea-level to 2500 ft. *Aka.* February–June.

According to Mr. J. W. Hall, the capsules require a whole year to ripen their seeds. Mr. Colenso's *M. aurata*, which is kept up as a variety by Mr. Kirk, only differs in the yellow or yellowish-orange flowers. It has been noticed in several districts from Auckland to Collingwood, but not more than a single specimen has been found in each locality. It can only be considered an accidental sport.

2. **M. lucida** *A. Rich. Fl. Nouv. Zel.* (1832) 333.—Usually a tall erect or inclined branching tree 30–60 ft. high, but often dwarfed to a small bush in subalpine or exposed localities; bark pale, papery; branchlets and young leaves silky. Leaves 1½–3 in. long, elliptic-lanceolate or lanceolate, acuminate, very coriaceous, pale glossy-green above, dotted with oil-glands beneath, narrowed into a short stout petiole. Flowers bright-crimson, in short broad cymes at the ends of the branches; peduncles and pedicels short, stout, silky. Calyx obconic, silky; lobes 5, ovate, obtuse. Petals oblong, exceeding the calyx-lobes. Stamens numerous, 1 in. long. Ovary sunk in the calyx-tube, 3-celled. Capsule ⅓ in. long, coriaceous, broadly urceolate, obscurely 5-ribbed, crowned by the persistent cup-shaped calyx-limb.—*A. Cunn. Precur.* (1839) n. 561; *Raoul Choix* (1846) 49; *Hook. f. Fl. Nov. Zel.* i (1853) 67; *Handb. N.Z. Fl.* (1864) 71; *T. Kirk Forest Fl.* (1889) t. 58; *Students' Fl.* (1899) 160; *Cheesem. Man. N.Z. Fl.* (1906) 163. M. umbellata *Cav. Ic.* iv (1795) 20, t. 337. Agalmanthus umbellatus *Homb. and Jacq. Voy. Astrol. et Zel.* (1852) 78. Melaleuca lucida *Forst. f. Prodr.* (1786) n. 216.

North Island: In hilly or mountain districts from Whangarei Heads and the Great and Little Barrier Islands southwards, but often local and absent from wide districts. South Island: Abundant along the western side, and along the shores of Foveaux Strait, less common on the eastern side. Stewart Island, The Snares, Auckland Islands: Abundant, forming a large proportion of the forest. Campbell Island: Rare. Sea-level to 3500 ft. *Southern-rata; Mountain-rata; Ironwood.* December–January.

Wood extremely strong, hard, heavy, and durable; useful for shipbuilding, &c.

3. **M. Parkinsonii** *Buch. in Trans. N.Z. Inst.* xv (1883) 389, t. 28, f. 2.—A much-branched shrub with straggling often prostrate branches, or a small tree 20–30 ft. high; trunk seldom more than 6–9 in. diam. Leaves more or less distichous 1–3 in. long, ovate-lanceolate to oblong-lanceolate or elliptic-ovate, acute or acuminate, rounded at the base, coriaceous, quite glabrous; petioles very short. Flowers bright-crimson, usually in dense paniculate cymes springing from the branches below the leaves, but sometimes terminating the branchlets as well. Calyx-tube turbinate, glabrous; lobes 5, ovate, triangular, obtuse. Stamens 1 in. long. Ovary sunk in the calyx-tube, 3-celled. Capsule ¼ in. long, coriaceous, broadly campanulate, obscurely 5-ribbed, crowned by the persistent cup-shaped calyx-limb.—*T. Kirk Students' Fl.* (1899) 160; *Cheesem. Man. N.Z. Fl.* (1906) 163; *Ill. N.Z. Fl.* i (1914) t. 49.

North Island: Summit of Mount Hobson, Great Barrier Island, *W. R. B. Oliver!* South Island: Nelson—Wakamarina Ranges, Anatore Ranges, Heaphy River, *W. S. Hayward! J. Dall!* Buller Valley, Nine-mile Creek, *R. J. Kingsley!* Mount Rochfort, *W. Townson!* Westland—Southern end of the Paparoa Range, near Greymouth, abundant, particularly on the slopes of Mounts Sewell and Davy, *P. G. Morgan!* Sea-level to 3000 ft. December–January.

A very handsome plant, which has the most restricted range of any of the New Zealand species. Its recent discovery by Mr. Oliver on the Great Barrier Island, quite 350 miles from the nearest of its southern habitats, affords a remarkable instance of discontinuous distribution.

Hook. Ic. Plant. t. 569 list
D. C. Prodr. 3. 224, Benth. & Hook. f. Suppl. p. 3422.

4. **M. albiflora** *Sol. ex Gaertn. Fruct.* i (1788) 172, t. 34, f. 11.—A much-branched woody climber, glabrous in all its parts; branchlets terete, slender, often drooping. Leaves decussate, $1\frac{1}{2}$–$3\frac{1}{2}$ in. long, elliptic-lanceolate or elliptic-ovate, acute or acuminate, glossy above, very coriaceous, narrowed at the base into a short stout petiole. Flowers white, in terminal much-branched paniculate cymes; pedicels pubescent. Calyx narrow-campanulate or almost tubular; lobes 5, ovate, obtuse, persistent. Petals exceeding the calyx-lobes, white, orbicular. Stamens and style filiform, $\frac{1}{2}$–$\frac{3}{4}$ in. long. Ovary adnate to the base of the calyx, 3-celled. Capsule $\frac{1}{4}$–$\frac{1}{3}$ in. long, splitting to the base into 3 valves when mature, urceolate, globose and 3-lobed below, crowned by the much narrower tubular calyx, the lobes of which are sharply reflexed at the top.—*Hook. f. Fl. Nov. Zel.* i (1853) 67; *Handb. N.Z. Fl.* (1864) 71; *T. Kirk Students' Fl.* (1899) 161; *Cheesem. Man. N.Z. Fl.* (1906) 164; *Ill. N.Z. Fl.* i (1914) t. 50. M. diffusa *A. Cunn. Precur.* (1839) n. 560 (*not of Smith*); *Hook. Ic. Plant.* (1843) t. 569.

North Island: Forests from Mangonui and Hokianga southwards to the East Cape, but often local. Ascends to 2800 ft. December–January.

A very handsome species, easily recognized by the large broad leaves and large panicles of white flowers.

5. **M. diffusa** *Sm. in Trans. Linn. Soc.* iii (1797) 268.—A tall and stout woody climber reaching the tops of the highest trees; young branchlets, inflorescence, and calyces pubescent or setose. Leaves $\frac{3}{4}$–$1\frac{1}{2}$ in. long, very shortly petioled, elliptic-oblong or ovate-oblong or ovate, obtuse or subacute, very coriaceous. Flowers very abundantly produced, bright-crimson, in terminal or rarely axillary much-branched cymes. Calyx-tube narrow-oblong, suddenly expanded into a broad cup-shaped limb; lobes 5, broadly oblong, persistent. Petals orbicular, shortly clawed; margins usually fimbriate or jagged. Ovary wholly adnate to the base of the calyx-tube. Capsule $\frac{1}{3}$ in. long, globose, rather coriaceous, 3- or 6-ribbed, 3-celled, loculicidally dehiscing to the base, crowned by the short cup-shaped calyx-limb.—*Hook. f. Fl. Nov. Zel.* i (1853) 67; *Handb. N.Z. Fl.* (1864) 71; *T. Kirk Students' Fl.* (1899) 161; *Cheesem. Man. N.Z. Fl.* (1906) 164; *Ill. N.Z. Fl.* i (1914) t. 48.

North Island: Not uncommon in forests from Mangonui and Ahipara to the East Cape and Taranaki. Sea-level to 2000 ft. September–October.

A most brilliant plant when in full bloom, well worthy of cultivation. For some remarks as to the validity of the name "*diffusa*" as applied to this plant, reference should be made to my "Illustrations of the New Zealand Flora," t. 48.

6. **M. hypericifolia** *A. Cunn. Precur.* (1839) n. 562.—A climbing shrub; branches slender, spreading, obscurely tetragonous, usually minutely pubescent. Leaves distichous, $\frac{1}{3}$–1 in. long, oblong-lanceolate or ovate-lanceolate or ovate-oblong, acute or apiculate or obtuse, rounded at the base, sessile, rather membranous, glabrous or slightly silky when young. Flowers small, pink or whitish-pink, in small lateral few-flowered cymes or racemes; pedicels slender, glabrous or pubescent. Calyx-tube pyriform, suddenly expanded into a short and broad cup-shaped limb; lobes 5, ovate-triangular. Petals orbicular, shortly clawed, exceeding the calyx-lobes. Stamens slender, $\frac{1}{3}$ in. long. Ovary wholly adnate to the base of the calyx-tube. Capsule small, $\frac{1}{8}$–$\frac{1}{6}$ in. long, globose, 3-lobed, crowned by the funnel-shaped calyx-limb, loculicidally 3-valved to the base.—*Raoul Choix* (1846) 49; *Hook. f. Fl. Nov. Zel.* i (1853) 67, t. 16; *Handb. N.Z. Fl.* (1864) 71; *T. Kirk Students' Fl.* (1899) 161; *Cheesem. Man. N.Z. Fl.* (1906) 164. M. subsimilis *Col. in Trans. N.Z. Inst.* xii (1880) 361.

North and South Islands, Stewart Island: Abundant in forests from the North Cape southwards. Sea-level to 2000 ft. November–January.

The smallest species of the genus. The flowers are occasionally quite white, and are always produced on the old wood, never terminal.

7. **M. Colensoi** *Hook. f. Fl. Nov. Zel.* i (1853) 68.—A slender climbing shrub with numerous very slender leafy terete or obscurely tetragonous branches; branchlets densely pubescent or setose. Leaves distichous, often imbricating, sessile or very shortly petioled, $\frac{1}{3}$–$\frac{3}{4}$ in. long, ovate or ovate-lanceolate, acute or acuminate, rounded at the base, almost membranous, densely pubescent when young, often becoming almost glabrous when mature. Flowers small, pink or whitish, in terminal or lateral trichotomous cymes which are rarely more than $1\frac{1}{2}$ in. long; peduncles and pedicels silky-pubescent. Calyx-tube funnel-shaped, much longer than the ovary, pubescent; lobes small, narrow-triangular, acute, as long as or slightly longer than the small orbicular petals. Ovary wholly adnate to the base of the calyx-tube. Capsule small, $\frac{1}{6}$–$\frac{1}{5}$ in. long, globose, 3-lobed, crowned by the long funnel-shaped calyx-limb, loculicidally 3-valved to the base.—*Handb. N.Z. Fl.* (1864) 72; *T. Kirk Students' Fl.* (1899) 162; *Cheesem. Man. N.Z. Fl.* (1906) 165.

Var. **pendens** *T. Kirk l.c.*—Branchlets much more slender, almost filiform, pendulous. Flowers white.—M. pendens *Col. in Trans. N.Z. Inst.* xii (1880) 360.

North and South Islands: Rare and local. In forests from the Bay of Islands and Whangarei (Handbook, *H. J. Matthews*) southwards to Cook Strait. Marlborough—As far south as the Lower Clarence Valley, *J. H. Macmahon! H. J. Matthews!* Nelson—Vicinity of Nelson and Maitai Valley, Lower Motueka Valley, *T. F. C.;* Mokihinui, *Petrie;* between Westport and Charleston, *Cockayne.* Sea-level to 2000 ft. December–January.

Allied to the preceding species, but easily distinguished by the much more slender habit, pubescent branchlets, and by the thinner much more acuminate and usually pubescent leaves.

8. **M. robusta** *A. Cunn. Precur.* (1839) n. 557.—A tall and stout forest-tree 60–80 or even 100 ft. high; trunk irregular, 3–8 ft. diam. or more; branches spreading, forming a huge rounded head; branchlets 4-angled, puberulous. Leaves decussate, 1–$1\frac{1}{2}$ in. long, elliptic-oblong or ovate-oblong or elliptic-lanceolate, obtuse, glabrous, very coriaceous; petioles

short, stout, glabrous or puberulous. Flowers dark-scarlet, very abundantly produced, in broad and dense terminal many-flowered cymes; peduncles and pedicels short, stout, pubescent. Calyx-tube short, obconic; lobes short and broad, triangular. Petals exceeding the calyx-lobes, orbicular. Ovary adnate to the base of the calyx-tube and included within it during the flowering stage. Capsule small, oblong, $\frac{1}{4}$–$\frac{1}{3}$ in. long, half-superior, girt round the middle by the rim of the calyx-tube, the free upper part loculicidally 3-valved.—*Hook. f. Fl. Nov. Zel.* i (1853) 68, t. 17; *Handb. N.Z. Fl.* (1864) 72; *T. Kirk Forest Fl.* (1889) t. 128; *Students' Fl.* (1899) 162; *Cheesem. Man. N.Z. Fl.* (1906) 165. M. florida *Hook. in Bot. Mag.* (1849) t. 4471 (*not of Smith*).

Var. **retusa** *T. Kirk l.c.*—Leaves shorter, $\frac{1}{2}$–$\frac{3}{4}$ in. long, elliptic, rounded at both ends, retuse. Two specimens in Mr. Kirk's herbarium, from Lowry Bay, Wellington.

North and South Islands: Abundant in forests from the North Cape southwards to Marlborough, Nelson, and Westland. Sea-level to 3000 ft. *Rata.* December–January.

A magnificent tree, sometimes reaching a gigantic size, specimens having been measured with trunks over 20 ft. diam. It usually (but not invariably) commences life as an epiphyte in the upper branches of some tall forest-tree, sending to the ground aerial roots, which coalesce and form a trunk after the death of the supporting plant. Terrestrial specimens are frequently seen, but these either have no trunk at all, keeping during life the habit of a much-branched bushy shrub, or produce a short, straight trunk of no great size. The timber is strong, hard, and durable, and is much employed for wheelwright's work, framework for machinery, wagons, &c., and for shipbuilding.

9. **M. tomentosa** *A. Rich. Fl. Nouv. Zel.* (1832) 336, t. 37.—Usually a much-branched tree 30–70 ft. high, with a short stout trunk 2–5 ft. diam., and large wide-spreading branches, but sometimes dwarfed to a few feet in height; branchlets stout, terete, tomentose. Leaves decussate, very variable in size and shape, 1–4 in. long, lanceolate or elliptic-lanceolate to oblong or broadly oblong, acute or obtuse, rounded at the base, very thick and coriaceous, usually clothed with white tomentum beneath, rarely glabrous; margins flat or recurved; petioles short, stout. Flowers large, dark-crimson, in broad terminal many-flowered cymes; peduncles and pedicels stout, and with the calyces clothed with dense white tomentum. Calyx-tube obconic; lobes short, deltoid. Petals oblong, obtuse, exceeding the calyx-tube. Stamens numerous, $1\frac{1}{4}$–$1\frac{1}{2}$ in. long. Ovary 3-celled, adnate to the base of the calyx-tube, and sunk within it during the flowering stage. Capsule $\frac{1}{3}$ in. long, half-superior, woody, tomentose, girt round the middle by the persistent calyx-limb, the free upper part loculicidally 3-valved.—*A. Cunn. Precur.* (1839) n. 558; *Raoul Choix* (1846) 49; *Hook. f. Fl. Nov. Zel.* i (1853) 68; *Handb. N.Z. Fl.* (1864) 72; *T. Kirk Forest Fl.* (1889) t. 118; *Students' Fl.* (1899) 163; *Cheesem. Man. N.Z. Fl.* (1906) 166.

North Island: Abundant along the coast from the Three Kings Islands and the North Cape to Poverty Bay and Urenui (Taranaki); inland on the shores of Lakes Rotorua, Rotoiti, and the smaller adjoining lakes; Lake Tarawera and the Tarawera River, and Lake Taupo. Reported from Lake Waikaremoana by *Colenso*, but I have seen no recent specimens. Sea-level to 2000 ft. *Pohutukawa; Christmas-tree.*

A noble and picturesque tree, very abundant on the rocky cliffs and headlands of the northern portion of the North Island. Banks and Solander recorded it from Totaranui (Queen Charlotte Sound) in the South Island; but this is probably an error. The wood is largely employed for shipbuilding and other purposes requiring strength, hardness, and durability.

10. **M. villosa** *Sm. in Trans. Linn. Soc.* iii (1797) 268.—A much-branched tree 20–60 ft. high, trunk 1–4 ft. diam.; branchlets, under-surface of leaves, inflorescence, and calyces densely covered with white tomentum. Leaves decussate, $\frac{3}{4}$–2 in. long, broadly ovate or broadly oblong, sometimes almost orbicular, obtuse at both ends, very coriaceous; margins recurved; petioles short, stout. Flowers scarlet, in small terminal many-flowered cymes; peduncles and pedicels short, stout. Calyx-tube broadly obconic; lobes short, deltoid, with a gland at the tip. Petals broadly oblong, exceeding the calyx-lobes. Stamens $\frac{1}{2}$–$\frac{3}{4}$ in. long. Ovary 3-celled, adnate to the base of the calyx-tube. Capsule $\frac{1}{4}$ in. long, half-superior, woody, tomentose, girt at the middle by the persistent calyx-limb, the free portion loculicidally 3-valved.—*T. Kirk Students' Fl.* (1899) 163; *Cheesem. Man. N.Z. Fl.* (1906) 167; *Oliver in Trans. N.Z. Inst.* xlii (1910) 137. M. polymorpha *Gaud. in Freyc. Voy. Bot.* (1826) 482, t. 85; *Hook. f. Handb. N.Z. Fl.* (1864) 73; *T. Kirk Forest Fl.* (1889) t. 119.

Kermadec Islands: Sunday Island, the most abundant tree, ascending to the tops of the hills, altitude 1700 ft. August–December.

A common plant in many of the Polynesian islands, varying greatly in size, shape of the leaves, presence or absence of tomentum, &c. The above description refers solely to the Kermadec Islands variety.

Druce 1916 635.

11. **M. scandens** *Sol. ex Gaertn. Fruct.* i (1788) 172, t. 34, f. 10.—A tall woody climber, reaching the tops of the highest trees; branches numerous, spreading, terete; branchlets tomentose or setose. Leaves distichous, sessile, $\frac{1}{3}$–$\frac{1}{2}$ in. long, broadly ovate or broadly oblong to orbicular, obtuse, very coriaceous, glabrous and shining above; paler, glandular-punctate and often pilose beneath: margins recurved. Flowers small, white, in pedunculate 3-flowered cymes crowded towards the ends of the branches, forming a leafy terminal panicle; peduncles and pedicels pubescent. Calyx-tube short, broadly turbinate; lobes short and broad, obtuse, persistent. Petals orbicular, white. Stamens slender, $\frac{1}{3}$ in. long. Ovary 3-celled, adnate to the base of the calyx-tube, and sunk in it during the flowering stage. Capsule globose, $\frac{1}{6}$ in. diam., half-superior, girt round the middle by the persistent calyx-limb, the free portion loculicidally 3-valved.—*Hook. f. Fl. Nov. Zel.* i (1853) 69; *Handb. N.Z. Fl.* (1864) 73; *T. Kirk Students' Fl.* (1899) 163; *Cheesem Man. N.Z. Fl.* (1906) 167. M. perforata *A. Rich. Fl. Nouv. Zel.* (1832) 334. M. buxifolia *A. Cunn. Precur.* (1839) n. 556; *Hook. Bot. Mag.* t. 4515. M. vesiculata *Col. in Trans. N.Z. Inst.* xvi (1884) 327. M. tenuifolia *Col. l.c.* xxiv (1892) 386. Melalenca perforata *Forst. f. Prodr.* (1786) n. 212. Leptospermum perforatum *Forst. Char. Gen.* (1776) 72.

North Island: Abundant in lowland forests throughout. South Island: Lowland districts in Nelson and Marlborough, not uncommon. Westland—Near Greymouth, *P. G. Morgan!* Okarito, near the sea, *Cockayne;* Martin's Bay, *Poppelwell, W. A. Thomson!* Sea-level to 2000 ft. *Aka.* January–March.

Well. Rec. Cant. Mus. iv: 1935 106.

On the eastern side of New Zealand I have seen no specimens from farther south than Marlborough, but it has been recorded from Banks Peninsula and the Auckland Islands—I believe, erroneously. Mr. Colenso's *M. tenuifolia,* as proved by the type specimens in his herbarium, is based upon the young plant, which has slender glabrous stems and almost membranous leaves. His *M. vesiculata* is a state in which the glands on the under-surface of the leaves and calyces are more conspicuous than usual.

3. **MYRTUS** Linn.

Shrubs or rarely trees, glabrous or pubescent or tomentose. Leaves opposite, often coriaceous, pellucid-dotted. Flowers axillary, solitary or in few-flowered cymes. Calyx-tube subglobose or turbinate; lobes 4–5, usually persistent. Petals 4–5, spreading. Stamens very numerous, in many series, free, longer than the petals. Ovary inferior, completely or imperfectly 2–3-celled; ovules numerous in each cell. Fruit a globose or ovoid berry, crowned with the persistent calyx-limb. Seeds few or many, reniform or almost globose; testa crustaceous or bony. Embryo terete, curved or annular; cotyledons small; radicle long.

Species about 70, most of them natives of South America, a few extending to Mexico and the West Indies. There are also 9 or 10 Australian species, and 1 (the common myrtle) widely spread over southern Europe and western Asia. The 4 New Zealand species are all endemic.

Leaves 1–2 in. long, tumid between the veins	1. *M. bullata.*
Leaves ⅔–1 in. long, flat	2. *M. Ralphii.*
Leaves ¼–½ in., obcordate. Calyx 4-lobed	3. *M. obcordata.*
Leaves ¼–½ in., obovate. Calyx 5-lobed	4. *M. pedunculata.*

1. **M. bullata** *Sol. ex A. Cunn. Precur.* (1839) n. 565.—An erect shrub, usually from 10 to 15 ft., but sometimes taller and becoming a small tree 20–25 ft. high; branchlets and young leaves tomentose. Leaves 1–2 in. long, reddish-brown, shortly petioled, broadly ovate or orbicular-ovate, obtuse or acute or apiculate, coriaceous, the surface tumid or blistered between the veins. Flowers axillary, solitary, ½ in. diam., white. Peduncles longer or shorter than the leaves, tomentose. Calyx 2-bracteolate at the base; lobes 4, obtuse or subacute. Petals orbicular, white. Berry ⅓ in. long, broadly ovoid, dark-red, becoming almost black when fully ripe, 2-celled. Seeds numerous, in 2 series in each cell, reniform; testa bony.—*Hook. Ic. Plant.* (1843) t. 557; *Bot. Mag.* (1854) t. 4809; *Raoul Choix* (1846) 49; *Hook. f. Fl. Nov. Zel.* i (1853) 70; *Handb. N.Z. Fl.* (1864) 74; *T. Kirk Forest Fl.* (1889) t. 131; *Students' Fl.* (1899) 164; *Cheesem. Man. N.Z. Fl.* (1906) 168.

North Island: Common in woods from the North Cape to Cook Strait. South Island: Various localities in Marlborough and Nelson, rare. Ascends to 2000 ft. *Ramarama.* December–January.

Easily distinguished by the tumid or blistered surface of the leaves, and by the calyx and petals being covered with minute warts. The peduncles are sometimes 2-flowered.

2. **M. Ralphii** *Hook. f. Fl. Nov. Zel.* ii (1855) 329.—An erect branching shrub 6–15 ft. high, rarely taller and becoming a small tree; branchlets very slender, and with the young leaves sparingly tomentose. Leaves ⅔–1 in. long, usually green, shortly petioled, ovate or oblong-ovate to orbicular-ovate, obtuse or acute, thinly coriaceous or almost membranous, the surface flat or very slightly tumid between the veins. Flowers quite as in *M. bullata* but slightly smaller. Berry ¼–⅓ in. long, broadly ovoid, dark-red, 2-celled. Seeds much fewer than in *M. bullata.*—*Handb. N.Z. Fl.* (1864) 74; *T. Kirk Forest Fl.* (1889) t. 94; *Students' Fl.* (1899) 165; *Cheesem. Man. N.Z. Fl.* (1906) 169.

North Island: From Ahipara (Mongonui County) to Cook Strait, but often local. South Island: Marlborough—Pelorus Valley and Queen Charlotte Sound, *J. H. Macmahon!* Nelson—Matai Valley, rare, *T. F. C.* Sea-level to 1500 ft. December–January.

Very closely allied to *M. bullata*, but the leaves are smaller, usually green, with the surface plane or very slightly tumid; and the berry has fewer seeds.

Dr. Cockayne (Trans. N.Z. Inst. 1 (1918) 179) considers that *M. Ralphii* is a polymorphic hybrid between *M. bullata* and *M. obcordata*. A series of specimens which he has kindly sent gives a certain amount of support to this view; but at present I am unable to accept it, for the following reason: I have been acquainted for 50 years with a locality for *M. Ralphii* in which, to the best of my belief, there are no specimens of *M. obcordata* within at least 20 miles, and none of *M. bullata* within 5 miles. This fact is in direct opposition to Dr. Cockayne's statement "that the species is never to be found unless both *M. bullata* and *M. obcordata* are present."

3. **M. obcordata** (Raoul) *Hook. f. Fl. Nov. Zel.* i (1853) 71.—A much-branched shrub 5–15 ft. high; branches slender, spreading, the younger ones pubescent. Leaves opposite or in opposite fascicles, $\frac{1}{5}$–$\frac{1}{2}$ in. long, obcordate, narrowed into a short puberulous petiole, coriaceous, glabrous on both surfaces or slightly silky when young. Flowers solitary, axillary, $\frac{1}{4}$ in. diam., white. Peduncles as long as the leaves, pubescent. Calyx 4-lobed; lobes oblong, acute. Petals 4, orbicular. Berry $\frac{1}{4}$ in. long, broadly ovoid, dark-red or violet, 2-celled. Seeds 1–2 in each cell, reniform; testa bony.—*Handb. N.Z. Fl.* (1864) 74; *T. Kirk Forest Fl.* (1889) t. 70; *Students' Fl.* (1899) 165; *Cheesem. Man. N.Z. Fl.* (1906) 169. Eugenia obcordata *Raoul in Ann. Sci. Nat.* Ser. iii, 2 (1844) ~~122.~~ 123. Chloris 28.

North and South Islands: In woods from Ahipara (Mongonui County) to Foveaux Strait, but local to the north of the East Cape. Sea-level to 2000 ft. *Rohutu.* December–January.

4. **M. pedunculata** *Hook. f. in Hook. Ic. Plant.* (1844) t. 629.—A much-branched compact or diffuse shrub 5–15 ft. high; branches slender, glabrous, 4-angled. Leaves opposite, $\frac{1}{4}$–$\frac{3}{4}$ in. long, obovate or obovate-oblong or oblong-ovate, rounded at the tip, rarely acute, coriaceous, glabrous, narrowed into short petioles. Flowers axillary, solitary, $\frac{1}{4}$ in. diam., white. Peduncles slender, glabrous, longer or shorter than the leaves. Calyx glabrous, 5-lobed, 2-bracteolate at the base. Petals 5, rounded. Berry small, $\frac{1}{4}$ in. long, broadly ovoid, red or yellowish, 2-celled. Seeds 2–5.—*Fl. Nov. Zel.* i (1853) 71; *Handb. N.Z. Fl.* (1864) 74; *T. Kirk Forest Fl.* (1889) t. 112; *Students' Fl.* (1899) 165; *Cheesem. Man. N.Z. Fl.* (1906) 169. Eugenia vitis-idaea *Raoul in Ann. Sci. Nat.* Ser. iii, 2 (1844) 122.

North and South Islands, Stewart Island: From Kaitaia and the Bay of Islands southwards, but local to the north of the Upper Waikato. Sea-level to 3500 ft. *Rohutu.* December–January.

Closely allied to *M. obcordata*, but easily recognized by the glabrous branchlets, obovate leaves rounded at the tip, and 5-lobed calyx.

4. **EUGENIA** Linn.

Shrubs or trees, glabrous or rarely tomentose or villous. Leaves opposite, penniveined. Flowers solitary and axillary, or in terminal or lateral cymes or panicles. Calyx-tube globose to narrow-turbinate; lobes 4, rarely 5. Petals the same number as the calyx-lobes. Stamens numerous, in many series. Ovary 2- or rarely 3-celled; style filiform; stigma small; ovules numerous in each cell. Fruit a berry, rarely dry and fibrous, crowned by the persistent calyx-limb. Seeds solitary or few, globose or variously compressed; testa membranous or cartilaginous. Embryo thick and fleshy; radicle short; cotyledons thick, more or less united or distinct.

An immense genus of more than 700 species, spread over the tropical and subtropical regions of both hemispheres. There is little to separate it from *Myrtus* except the thick and fleshy embryo with a short radicle. The single New Zealand species is endemic.

1. **E. maire** *A. Cunn. Precur.* (1839) n. 564.—A small tree 20–50 ft. high, perfectly glabrous in all its parts; trunk 1–2 ft. diam., with white bark; branchlets slender, 4-angled. Leaves opposite, 1–2 in. long, oblong-lanceolate or elliptic-lanceolate to elliptic-oblong, acute or acuminate, rather membranous, narrowed into short slender petioles. Flowers $\frac{1}{2}$ in. diam., sometimes almost unisexual, white, in terminal many-flowered corymbose panicles $1\frac{1}{2}$–3 in. broad; pedicels slender, glabrous. Calyx-tube broadly obconic; lobes very short, broad, deciduous. Petals orbicular, falling away early. Stamens slender, $\frac{1}{2}$–$\frac{2}{3}$ in. long. Ovary wholly adnate to the base of the calyx-tube, 2-celled; ovules numerous. Berry $\frac{1}{2}$ in. diam. or more, irregularly globose, red, crowned by the persistent calyx-limb, 1-celled. Seed solitary, large; testa hard, coriaceous.—*Raoul Choix* (1846) 49; *Hook. f. Fl. Nov. Zel.* i (1853) 71; *Handb. N.Z. Fl.* (1864) 74; *T. Kirk Forest Fl.* (1889) t. 122; *Students' Fl.* (1899) 165; *Cheesem. Man. N.Z. Fl.* (1906) 170.

North Island: Swampy forests from the North Cape southwards, abundant. South Island: Queen Charlotte Sound and Pelorus Valley, *J. Rutland.* Sea-level to 1500 ft. *Maire-tawake.* March–May.

For an account of the discovery of pneumatophores in this species, reference should be made to a short note by myself published in Trans. N.Z. Inst. lii (1920) 9.

Family LXXIV. ONAGRACEAE.

Herbs, rarely shrubs or small trees. Leaves opposite or alternate, simple, entire or toothed, exstipulate. Flowers usually regular, hermaphrodite. Calyx-tube often elongated, altogether adnate to the ovary, sometimes produced beyond it; limb of 2–5 valvate lobes. Petals as many as the calyx-lobes, inserted at the top of the calyx-tube, rarely wanting. Stamens as many or twice as many as the petals, inserted with them. Ovary inferior, usually 2–4-celled; style simple, filiform; stigma capitate or 2–4-lobed; ovules usually numerous in each cell, in 1 or 2 series, pendulous or ascending; placentas axile. Fruit various, generally a 2–4-celled capsule with loculicidal or septicidal dehiscence, sometimes a berry, rarely nut-like. Seeds usually small, sometimes provided with a tuft of hairs; albumen none, or a thin layer only.

A small family of about 36 genera and 480 species, widely spread in temperate regions, rare in the tropics; most plentiful in North America, especially in Mexico. Many of the species have handsome flowers, and are frequently cultivated in gardens, particularly the genera *Godetia*, *Oenothera*, *Clarkia*, and *Fuchsia*, but they have no other economical importance. Of the New Zealand genera, *Epilobium* is universal in cool climates; *Fuchsia* is confined to South America with the exception of the New Zealand species.

Herbs. Fruit an elongated capsule. Seeds with a tuft of hairs .. 1. Epilobium.

Shrubs or small trees. Fruit a berry .. .. 2. Fuchsia.

1. **EPILOBIUM** Linn.

Herbs; stems erect or decumbent or creeping, sometimes hard and almost woody at the base. Leaves alternate or opposite, entire or toothed. Flowers rose-coloured or purple or white, solitary in the upper axils or forming a terminal raceme or spike. Calyx-tube scarcely produced beyond the ovary, linear, 4-angled or nearly terete; limb 4-partite, deciduous. Petals 4, obovate or obcordate, spreading or erect, Stamens 8, the 4 alternate ones shorter. Ovary inferior, 4-celled; style filiform; stigma clavate or with 4 spreading or erect lobes; ovules numerous, 2-seriate, ascending. Capsule elongate, 4-angled, 4-celled and 4-valved, the valves separating and curving back from a central seed-bearing axis. Seeds numerous, broadest above, the summit furnished with a tuft of long hairs.

A large genus in the temperate and cold regions of both hemispheres; rare in the tropics, except on high mountains; more abundant in New Zealand than in any other part of the world. Species variously estimated by authors, from 60 to nearly 200.

The species of *Epilobium* are well known to be highly variable in any country that they inhabit, but in New Zealand the amount of variation is inordinately great, making it difficult to affix limits to many of the species, which appear to merge gradually into one another. In the arrangement of the New Zealand forms I have for the most part followed Professor Haussknecht's elaborate and beautifully illustrated monograph, but I have been unable to accept the whole of the species he has proposed, several of them appearing to me to rest on characters much too trival or inconstant. The beginner will find it most difficult to identify any of the species with certainty, and his only safe course is to collect copious suites of specimens and to defer all attempts to name them until he has gained a clear idea of the prevalent forms and their characters.

A. Similes. *Stems tall, erect, herbaceous, slightly woody at the base. Flowers numerous, towards the ends of the branches.*

* Leaves sessile or nearly so.

Tall, often 3 ft. or even more. Leaves lanceolate or linear-lanceolate. Flowers numerous, large, $\frac{1}{2}$–$\frac{3}{4}$ in. diam., white — 1. *E. pallidiflorum.*

Slender, 1–3 ft. Leaves distant, ovate-oblong. Flowers few, large, $\frac{1}{3}$–$\frac{1}{2}$ in., white. Seeds smooth — 2. *E. chionanthum.*

Stout, $\frac{3}{4}$–2 ft. Leaves close-set, ovate or ovate-oblong. Flowers small, $\frac{1}{6}$–$\frac{1}{5}$ in. diam., red — 3. *E. Billardierianum.*

Tall, stout, 2–5 ft. Leaves linear-lanceolate to ovate-lanceolate. Flowers small, $\frac{1}{4}$ in. long., reddish-purple — 4. *E. erectum.*

Strict, erect, much branched, 6–18 in. or more; clothed with greyish-white pubescence. Leaves linear, with remote denticles. Flowers small, reddish — 5. *E. junceum.*

Tall, erect, 1$\frac{1}{2}$–3 ft., villous with long spreading hairs mixed with short erect ones. Leaves lanceolate, irregularly denticulate. Flowers purplish — 6. *E. hirtigerum.*

** Leaves distinctly petiolate.

Slender, $\frac{1}{2}$–2 ft. Leaves ovate or ovate-oblong, membranous. Flowers $\frac{1}{5}$–$\frac{1}{4}$ in., white or pink — 7. *E. pubens.*

B. Microphyllae. *Stems small, slender, herbaceous, creeping below, erect or ascending towards the tips. Flowers few, towards the ends of the branches.*

* Fruiting-peduncles short, seldom exceeding the leaves.

Forming matted patches 2–8 in. diam.; stems bifariously pubescent. Leaves nearly sessile, close-set, often imbricate, $\frac{1}{4}$–$\frac{1}{2}$ in. long, fleshy, oblong-obovate. Flowers bright-pink — 8. *E. confertifolium.*

Forming matted patches 2–5 in. diam.; stems not bifariously pubescent. Leaves shortly petiolate, spreading, ovate-oblong, $\frac{1}{4}$–$\frac{1}{3}$ in. long, pale-green. Flowers few, white or pink — 9. *E. tasmanicum.*

Stems 3–10 in., ascending. Leaves linear-oblong, coarsely toothed, blotched, $\frac{1}{2}$–$\frac{3}{4}$ in. long. Capsules evenly hoary-pubescent — 10. *E. pictum.*

** Fruiting-peduncles elongated.

† Leaves comparatively narrow, linear or linear-oblong to oblong.

Stems 1–4 in. Leaves linear or linear-oblong, $\frac{1}{5}$–$\frac{1}{2}$ in. Capsule slender. Peduncles much elongated .. .. .. 11. *E. tenuipes.*
Stems 2–6 in. Leaves linear-oblong to oblong, $\frac{1}{4}$–$\frac{1}{2}$ in. Capsule pubescent on the angles .. .. 12. *E. Hectori.*

†† Leaves broad, oblong to ovate or orbicular.

Stems 2–10 in., slender, pubescent. Leaves small, $\frac{1}{3}$–$\frac{1}{2}$ in., broadly oblong to orbicular. Capsule evenly pubescent .. 13. *E. alsinoides.*
Stems 5–10 in., bifariously pubescent. Leaves $\frac{1}{5}$–$\frac{1}{3}$ in., ovate or ovate-oblong. Capsule brownish-red, glabrous or nearly so .. .. 14. *E. Cockaynianum.*
Stems 6–18 in., slender, firm. Leaves ovate-cordate. Flowers large, $\frac{1}{3}$ in. diam. Capsule 1–2 in. .. .. .. 15. *E. chloraefolium.*
Stems 9–12 in. high, slender, sparingly branched, bifariously pubescent. Leaves $\frac{1}{2}$–1 in., oblong-lanceolate, membranous. Flowers few, large, $\frac{1}{4}$–$\frac{1}{2}$ in. diam., petals twice as long as sepals, white. Capsule $\frac{3}{4}$–$1\frac{1}{4}$ in. .. .. .. 16. *E. Wilsoni.*
Stems 6–18 in., weak and flaccid. Leaves distant, ovate, entire or obscurely toothed, almost sessile, membranous .. 17. *E. insulare.*
Stems 6–18 in., weak. Leaves distant, orbicular, sharply toothed, petiolate, membranous.. .. .. 18. *E. rotundifolium.*

C. Sparsiflorae. *Stems small, slender, prostrate and creeping, herbaceous. Flowers few, in the axils of the intermediate leaves. Capsules long-stalked.*

Leaves $\frac{1}{4}$–$\frac{1}{2}$ in., orbicular, sharply toothed, membranous .. 19. *E. linnaeoides.*
Stems 3–8 in. long, bifariously pubescent. Leaves petiolate, remote, orbicular, $\frac{1}{6}$–$\frac{1}{2}$ in. long, margins denticulate. Mature capsules $\frac{3}{4}$–$1\frac{1}{2}$ in., pubescent .. .. 20. *E. nummularifolium.*
Stems slender, 3–8 in. long, often matted, glabrous when mature. Leaves crowded, $\frac{1}{8}$–$\frac{1}{3}$ in., coriaceous, entire or nearly so. Mature capsules glabrous .. .. 21. *E. pedunculare.*
Stems densely matted, 1–5 in. long, green or reddish, usually glabrous. Leaves crowded, thick and coriaceous, often rugulose, $\frac{1}{10}$–$\frac{1}{4}$ in. long. Mature capsules $\frac{1}{2}$–1 in., glabrous .. 22. *E. nerterioides.*
Stems 1–4 in. long, purplish-black. Leaves $\frac{1}{4}$–$\frac{1}{2}$ in., orbicular-oblong, thick and coriaceous, purplish below. Capsule glabrous .. .. 23. *E. purpuratum.*
Stems numerous, slender, branched, 3–10 in. long. Leaves $\frac{1}{4}$–$\frac{3}{4}$ in., ovate, obscurely toothed. Flowers large, $\frac{1}{4}$–$\frac{1}{3}$ in. diam. Capsules 1–2 in., glabrous .. .. 24. *E. macropus.*

D. Dermatophyllae. *Suffruticulose, usually small, stems hard and woody at the base. Leaves more or less rigid and coriaceous. Flowers few, terminal or nearly so.*

* Fruiting-peduncles elongated.

Much branched, slender, wiry, bifariously pubescent, 3–6 in. high. Leaves ovate, petiolate, $\frac{1}{4}$–$\frac{2}{3}$ in. .. .. 25. *E. gracilipes.*
Stout, fleshy, prostrate, glabrous, 2–6 in. long. Leaves large, obovate-spathulate, entire, $\frac{3}{4}$–$1\frac{1}{2}$ in. long .. .. .. 26. *E. crassum.*

** Fruiting-peduncles short.

Stems prostrate or straggling, glabrous, 6–15 in. Leaves elliptic, coriaceous and shining, reddish, acute, petiolate, $\frac{3}{4}$–1 in. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. .. .. 27. *E. brevipes.*
Stems prostrate or decumbent, bifariously pubescent, 4–8 in. Leaves oblong or oblong-ovate, obtuse, coriaceous, glossy, $\frac{1}{4}$–$\frac{3}{4}$ in. Flowers sessile, very large, $\frac{1}{2}$–$\frac{3}{4}$ in. .. .. 28. *E. vernicosum.*
Stems 3–6 in., prostrate and rooting below, bifariously pubescent. Leaves linear-oblong to oblong-ovate, often distichous, $\frac{1}{4}$–$\frac{1}{3}$ in. Flowers $\frac{1}{5}$–$\frac{1}{4}$ in. Capsules glabrous .. 29. *E. rubromarginatum.*
Stems numerous, decumbent, 2–8 in. Leaves crowded, linear-oblong, coarsely denticulate, $\frac{1}{2}$–$\frac{3}{4}$ in. long. Flowers sessile, white, crowded, $\frac{1}{4}$ in. Capsules almost hidden by the leaves 30. *E. pycnostachyum.*

E. perrittans Chr. add. 57(1925) 22.
E. porphyreum Smith: 75( ) 159.
E. cinereum A. Rich. Chr. Rep. Sem. Hort. 1915: 60
E. antipoda Petrie T. 46: 32.

EPILOBIUM: acc. to Haussknecht.

1. Leiospermae: seminum testa glaberrima . . 2
   adenospermae: seminum testa papillose . . 8
2. Fol. coriaceis; Pl.suffrutic 3
   Fol. flaccidis; (Pl.p.m.p. Lertac.) . . . 5
3. Caps. ad ang. argenteo-tomentosee . . . .
   . . . . . microphyllum
   Caps. glatevrimae 4
4. Fol. elliptica; Petive, manifer . . brevipes
   Fol. ovata; Petrie breviss . . . . macropus
5. Flor. speciosi, 10-15 mm. largi . chionanthum
   Flor. minuti, 3-5 mm. largi 6
6. Fol. rotundato-ovata, brev. petiol . . .
   . . . . . insulare
   Fol. non rot-ovata, sessilia 7
7. Fol. linearia, v. oblongo-linearia . . .
   . . . . . tenuipes
   Fol. elliptica . . . . . hectori
8. Flor. term. m.m. numerosi; in ax. fol. sup.
   9
   Flor. panci. sparse in ax. fol. intermed 27
9. Caps. brev. ped.; ped. fol. futcr. heviorib-
   us 10
   Caps. longe v. medioc. ped.; ped. fol. futcr.
   + = v + 7 18
10. Pl. nanae herbaceae, caespitosae 11
    Pl. erect., suff., cane. purpureis . . . 13
11. Folia denticulata . . . . . tasmanicum
    Folia integerrima 12
12. Fol. in pet. pellucid. Cuneato-argustata
    . . . . . confertifolium
    Fol. basi rotundara vix petiolata . . . .
    . . . . . thymifolium
13. Fol. integerrima . . . . . Krulleanum
    Fol. denticulata 14
14. Flores laxa 15
    Fl. condensata v. abbreviata 16
15. Infl. subcorymbosa, dichotoms-ramosa . .
    . . . . . polyclonum
    Infl. elongata, fol. petiolata . . glabellum
16. Infl. valde condensata, elongata . . . .
    . . . . . pycnostachyum
    Infl. abbreviata, fol. sessilia 17

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Stems numerous, rigid, erect, black. Leaves crowded, linear-oblong, toothed or lobed, $\frac{1}{4}$–$\frac{5}{8}$ in. long. Flowers small, $\frac{1}{5}$ in.

17. Fol. interm. prof. repando-dentata, dent. elong. . . . . .melanocaulon
Fol. interm. paullo denticulata, dent. heriss. . . . . erubescens
18. Caps. long. ped.; ped. fol. pulcr. mulbs.; Pl. pumilae 19
* Caps. med. ped.; ped. fol. pulcr. + = v.+ 7; Pl. erectae 22
(* excpt. nov. zel. pl. pumila)
19. Fol. majus; spath.-oblonga, coriac.; caps glab. . . . . .crassum
Fol. parva; subrotunda, flaccid.; cap. pilosae 20
20. Fol. denticulata . . . . . .rotundifolium
Fol. sutintegerrina 21
21. Flor. parvi, 4-5 mm. longi . . . alsinoides
Flor. majusc.; 9 mm. longi . chloraefolium
22. Folia petiolata 23
Folia sessilia 24
23. Folia pubescentia . . . . . pubens
Fol. glaberrima . . . . . .novae-zelandiae
24. Fol. ovata . . . . . Billardieranum
Fol. lanceolata 25
25. Folia acuta 26
Folia obtusa vel mucronulata . . . junceum
26. Fl. speciosi, 2 cm. long., Fol. tenu. pub. . . . . pallidiflorum
Fl. medioc., 6-8 mm. long., Fol. pubs. . . . . hirtigerum
27. Caps. pubescentes . . . . . .nummularifolium
Caps. glabrae 28
28. Folia integerrima 29
Folia manifeste denticulata 31
29. Folia coriacea 30
Folia flaccida . . . . . (perpusillum)
30. Caps. atropusp., ped. cressiurc. purpuratum
Caps.pallidae. ped. tenuiss. . .peduncularе
31. Fol. majusc., 12 mm. longa latagne . . . . . linnaeoides
Fol. minuta, 4 mm. longa latagne caespitosum

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Stems numerous, rigid, erect, black. Leaves crowded, linear-oblong, toothed or lobed, $\frac{1}{4}$–$\frac{2}{3}$ in. long. Flowers small, $\frac{1}{5}$ in. Capsules glabrous	31. *E. melanocaulon.*
Stems numerous, erect, 2–6 in., grey with fine pubescence. Leaves crowded, linear-oblong, coarsely toothed. Capsule suddenly narrowed below the tip, finely pubescent ..	32. *E. rostratum.*
Stems numerous, rigid and wiry, purplish-black, 3–8 in. Leaves small, uniform, ovate-orbicular, entire, $\frac{1}{8}$–$\frac{1}{5}$ in. Capsules silvery-pubescent at the angles	33. *E. microphyllum.*
Stems numerous, short, 2–6 in. Leaves oblong-ovate, entire, $\frac{1}{3}$–$\frac{1}{2}$ in. Flowers small, $\frac{1}{5}$ in. Capsule glabrous	34. *E. Krulleanum.*
Stems numerous, erect, 6–14 in. Leaves oblong or linear-oblong, obtuse, often reddish, sinuate-denticulate, $\frac{1}{3}$–$\frac{3}{4}$ in. Flowers $\frac{1}{6}$–$\frac{1}{4}$ in. Capsules on short peduncles	35. *E. glabellum.*
Stems few or many, erect, 5–7 in. high. Leaves $\frac{3}{4}$–1 in., elliptic to broad-oblong, often reddish. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in., reddish. Capsules on short peduncles	36. *E. Matthewsii.*
Stems branched, erect, 3–9 in. Leaves narrower than in *E. glabellum*, pale-green. Flowers $\frac{1}{5}$ in. Capsules on peduncles that slightly elongate	37. *E. novae-zelandiae.*

1. E. pallidiflorum *Sol. ex A. Cunn. Precur.* (1839) n. 550.—Stems leafy, terete, 1–3 ft. high, decumbent and rooting at the base and emitting numerous stolons, erect above, simple or branched, glabrous below, finely puberulous above. Leaves 1–4 in. long, opposite or the uppermost alternate, often semiamplexicaul, sessile or nearly so, lanceolate or linear-lanceolate or linear-oblong, gradually tapering to an acute point, irregularly denticulate or almost entire, glabrous or the margins puberulous. Flowers usually numerous towards the ends of the branches, large, handsome, $\frac{3}{4}$ in. diam., white or pale-rose. Calyx-lobes $\frac{1}{2}$ as long as the corolla, lanceolate, acute. Petals obcordate. Stigma oblong-clavate. Capsules 2–4 in. long, finely and densely hoary-pubescent; peduncles shorter than the leaves. Seeds minutely papillose.—*Hook. f. Fl. Nov. Zel.* i (1853) 61; *Handb. N.Z. Fl.* (1864) 81; *Benth. Fl. Austral.* iii (1866) 305; *Haussk. Monog. Epilob.* (1884) 292; *T. Kirk Students' Fl.* (1899) 169; *Cheesem. Man. N.Z. Fl.* (1906) 169; *Ill. N.Z. Fl.* i (1914) t. 51. E. macranthum *Hook. Ic. Plant.* (1840) t. 297.

North and South Islands, Chatham Islands, Stewart Island: Abundant in marshes from the North Cape southwards. Sea-level to 2500 ft. November–February.

A very handsome and distinct species, readily known by the large size, long acute leaves, and large white flowers. It is said to be found in Australia and Tasmania; but I have had no oppotrunity of comparing specimens.

2. E. chionanthum *Haussk. in Oestr. Bot. Zeitschr.* xxix (1879) 149.—Stems slender, 1–3 ft. high, decumbent and stoloniferous at the base, ascending above, simple or rarely branched, terete, glabrous below, usually thinly puberulous above. Leaves all opposite except the floral ones, distant, $\frac{3}{4}$–$1\frac{1}{2}$ in. long, sessile or nearly so, ovate-oblong or oblong lanceolate, obtuse or subacute, pale-green, minutely denticulate, glabrous. Flowers in the axils of the upper leaves, few (1–6) large, $\frac{1}{3}$–$\frac{1}{2}$ in. diam., white. Calyx-segments lanceolate, acute, puberulous. Petals obcordate, much longer than the calyx. Stigma capitate. Capsule 2–3 in. long, rather stout, puberulous; pedicels about twice as long at the leaves. Seeds smooth.—*Haussk. Monog. Epilob.* (1884) 287, t. 22, fig. 92, *a*, *b*; *T. Kirk Students' Fl.* (1899) 168; *Cheesem. Man. N.Z. Fl.* (1906) 173.

North and South Islands, Chatham Islands: Abundant in swampy places from the North Cape to Foveaux Strait. Sea-level to 2000 ft. November–February.

A well-marked plant, easily recognized by the slender usually simple stems, distant pale-green and glabrous leaves, large white flowers, and smooth seeds.

3. **E. Billardierianum** *Ser. in DC. Prodr.* iii (1828) 41. — Stems stout, leafy, ¾–2 ft. high, decumbent and woody at the base and giving off numerous stolons, strict and erect above, simple or branched, dull-green or reddish, usually with hoary-pubescent lines decurrent from the leaves. Leaves ¾–1½ in. long, variable in shape, ovate or ovate-oblong to linear-oblong, obtuse or rarely subacute, sessile, lower opposite and often connate at the base, upper sometimes alternate, glabrous, finely and closely denticulate. Flowers numerous, small, ⅙–⅕ in. diam., pink, crowded in the upper axils. Calyx-lobes ovate-lanceolate, nearly equalling the petals. Stigma rounded-clavate. Capsules 1–2½ in. long, finely and evenly hoary-pubescent; peduncles shorter or slightly longer than the leaves. Seeds minutely papillose.—*Haussk. Monog. Epilob.* (1884) 293; *T. Kirk Students' Fl.* (1899) 170; *Cheesem. Man. N.Z. Fl.* (1906) 174. E. tetragonum *Hook. f. Fl. Nov. Zel.* i (1853) 60; *Benth. Fl. Austral.* iii (1866) 305 (*not of Linn.*).

North and South Islands, Stewart Island, Chatham Islands: Abundant throughout, ascending to 2000 ft. November–February. Also in Australia and Tasmania.

The distinctive characters of this species are the robust habit, usually reddish stems, broad obtuse leaves, and numerous small pinkish flowers; but some varieties approach *E. junceum* very closely. Professor Haussknecht distinguishes two forms: *a*, *simplex*, with an unbranched few-flowered stem and small rather remote oblong leaves narrowed at the base; and *b*, *major*, which has the stem stouter and branched, and the leaves larger, broader, and cordate at the base.

4. **E. erectum** *Petrie in Trans. N.Z. Inst.* xxxiv (1902) 390. — Stems tall, stout, terete, 2–5 ft. high, strict, erect, simple or sparingly branched, glabrescent and often reddish below, finely and sparsely pubescent above, marked by decurrent ridges from the margins of the leaves. Leaves sessile, 1½–3½ in. long or even more, linear-lanceolate or ovate-lanceolate, opposite at the base, alternate above, tapering gradually to an acute tip, closely but irregularly and bluntly toothed along the margins, midrib and secondary veins evident, thin and membranous, glabrous or pubescent along the margins and principal veins. Inflorescence much branched and leafy, many-flowered. Flowers small, pale reddish-purple, ¼ in. long. Calyx-segments linear-lanceolate, acute, finely pubescent. Capsules long, slender, slightly curved, 2–3 in. long, tapering upwards into a short style, finely and evenly pubescent, sometimes almost hoary; peduncles short, seldom more than ¼ in. long. Seeds ovoid, papillose.—E. junceum *var.* macrophyllum *Haussk. Monog. Epilob.* (1884) 290; *Cheesem. Man. N.Z. Fl.* (1906) 175. See Chem. Rep. Tong. N.Z. 1908: 38.

North and South Islands: Abundant in marshes from the Northern Wairoa River southwards to Cook Strait, and thence to north-west Nelson and northern Marlborough, and probably farther south. Ascends to 3500 ft. on Mount Egmont. December–February. T. 71: 88.

The largest species of *Epilobium* known in New Zealand, Mr. Petrie having gathered specimens 6 ft. high, with a stem as thick as the little finger. In the first edition of this work I followed Haussknecht in treating it as a variety of *E. junceum*, a view which I am now satisfied is incorrect.

5. **E. junceum** *Soland. in Forst. f. Prodr. Append.* (1786) n. 516, *nomen nudum.*—Stems strict and erect from a hard almost woody decumbent base, 6–18 in. high or more, slender, terete, leafy, simple or branched, sometimes excessively so, more or less covered with fine greyish-white pubescence, sometimes almost glabrate towards the base. Leaves often crowded on short axillary branchlets, variable in size, ½–1½ in. long, sessile, oblong-lanceolate to linear-lanceolate or linear-spathulate, subopposite at the base, alternate above, abruptly mucronulate at the apex, margins furnished with distantly placed denticles, both surfaces more or less clothed with fine ashy pubescence, rarely almost glabrous. Inflorescence leafy, towards the top of the stems. Flowers small, pale-rose, ¼ in. long. Calyx-segments linear-lanceolate, acute, ashy-pubescent. Capsule long, slender, erect, straight or curved, 2–3 in. long, tapering upwards into a short truncate style; peduncle short, seldom exceeding the leaves. Seeds oblong-obovoid, papillose.—*Spreng. Syst.* ii (1825) 233; *A. Cunn. Precur.* (1839) n. 551; *Raoul Choix* (1846) 49; *Hook. f. Fl. Nov. Zel.* i (1853) 60 (*in part*); *Handb. N.Z. Fl.* (1864) 80 (*in part*); *Haussk. Monog. Epilob.* (1884) 289 (*in part*); *T. Kirk Students' Fl.* (1899) 169 (*in part*); *Cheesem. Man. N.Z. Fl.* (1906) 174 (*in part*). E. cinereum *A. Rich. Fl. Nouv. Zel.* (1832) 330; *A. Cunn. Precur.* (1839) n. 544. E. incanum, E. virgatum, and E. confertum *A. Cunn. l.c.* nn. 545, 547, 549.

North and South Islands, Stewart Island: Abundant in lowland districts throughout, especially in the northern part of the North Island, but not common in the elevated districts of either the North or South Island. Sea-level to 2000 ft. November–March.

New Zealand botanists have had much difficulty in deciding which species of *Epilobium* was entitled to bear Solander's name of *junceum*. The facts are as follows: *E. junceum* was discovered by Banks and Solander at "Te Oneroa," the locality where the present Town of Gisborne now stands, and was gathered by them in almost every locality visited during Cook's first voyage. A description of it was prepared by Solander for his manuscript Flora of New Zealand, a work which, as is well known, was never actually issued. Forster also collected it during Cook's second voyage—probably at Queen Charlotte Sound—and published it in his Prodromus under Solander's name—unfortunately, without any description. Consequently, without access to the Banksian collection, the whole of which was lodged in the British Museum, it was practically impossible to be sure of the identity of the species. Hooker, when preparing the "Flora Novae-Zelandiae," examined the Bankisan collection, and applied the name of *junceum* to a group of plants including *E. hirtigerum*, *E. erectum*, and *E. cinereum*, but did not associate the name of "*junceum*" with any one of them. He followed the same plan in the Handbook; and even Haussknecht, whose Monograph appeared in 1884, still treated "*junceum*" as the head of a number of varieties without particularizing any one to bear the name.

From the above it is quite clear than an examination of the Banksian types was absolutely necessary to determine the identity of the plant. Fortunately, through the liberality of Dr. Rendle, of the British Museum, I received, a few years ago, a fairly complete set of the plants collected by Banks and Solander during Cook's first voyage. On referring to the *Epilobia* I found two specimens labelled "*Epilobium junceum.*" These are practically identical with *E. cinereum* A. Rich. In future, therefore, that name must be treated as a synonym of *E. junceum* Sol.

It is worth mention that Solander divided his "*junceum*" into two varieties: var. *a*, *campestre*, which answers to *E. cinereum* A. Rich., and var. *b*, *limosum*, which the specimens prove to be *E. hirtigerum* A. Cunn.

6. **E. hirtigerum** *A. Cunn. Precur.* (1839) n. 546.—Stems greyish-green, tall, strict, erect, ½–3 ft. high, simple or branched, densely leafy, villous throughout with horizontally spreading hairs intermixed with shorter ones; branchlets arcuate, ascending. Leaves 1–2½ in. long, sessile, crowded, the

very lowest subopposite, the remainder alternate, lanceolate or linear-lanceolate, acute, upper portion armed with irregularly placed remote denticles, lower part entire, both surfaces densely covered with spreading hairs, midrib prominent beneath, villous. Flowers erect, rather small, ¼ in. long. Calyx-segments lanceolate, acute; tube short, villous. Petals purplish, slightly longer than the calyx. Stigma capitate-clavate. Capsule 2–3 in. long, straight or curved, densely villous; peduncle very short, many times shorter than the capsule. Seeds ovoid-oblong, red-brown, densely papillose.—*Raoul Choix* (1846) 49; *Haussk. Monog. Epilob.* (1884) 291. E. junceum *var.* hirtigerum *Hook. f. Fl. Nov. Zel.* i (1853) 60; *Handb. N.Z. Fl.* (1864) 80; *T. Kirk Students' Fl.* (1899) 169; *Cheesem. Man. N.Z. Fl.* (1906) 175.

North and South Islands: Abundant from the North Cape southwards to Westland and South Canterbury. Sea-level to 2000 ft. November–March.

Further study of this plant has fully convinced me that Haussknecht was fully justified in maintaining it as a distinct species. Its distinguishing characters are the tall strict habit, usually greyish-green colour, dense clothing of villous spreading hairs mixed with shorter ones, the small flowers, and very short peduncles. According to Haussknecht it is not uncommon in south-eastern Australia and Tasmania.

7. **E. pubens** *A. Rich. Fl. Nouv. Zel.* (1832) 329, t. 36.—Stems ½–2 ft. high, slender, simple or branched, decumbent and woody at the base, erect above, terete, uniformly clothed with a short fine pubescence. Leaves all alternate or the very lowest alone opposite, ½–1½ in. long, ovate or ovate-oblong, obtuse or rarely subacute, narrowed into slender petioles, pubescent on both surfaces, membranous, toothed or repand-denticulate. Flowers in the axils of the upper leaves, numerous, small, ⅛–¼ in. diam., white or pink. Calyx-lobes lanceolate, acute, puberulous. Stigma clavate. Capsules 1–2 in. long, hoary-pubescent; peduncles shorter than the leaves. Seeds minutely papillose.—*A. Cunn. Precur.* (1839) n. 543; *Raoul Choix* (1846) 49; *Hook. f. Fl. Nov. Zel.* i (1853) 61; *Handb. N.Z. Fl.* (1864) 80; *Haussk. Monog. Epilob.* (1884) 29; *T. Kirk Students' Fl.* (1899) 170; *Cheesem. Man. N.Z. Fl.* (1906) 175.

North and South Islands, Stewart Island, Chatham Islands: Abundant from the North Cape southwards. Sea-level to nearly 4000 ft. October–January. Also in Australia, according to Professor Haussknecht.

8. **E. confertifolium** *Hook. f. in Ic. Plant.* (1844) t. 685.—Main stems 2–8 in. long, creeping and rooting at the nodes, much branched, often forming broad matted patches; branches rooting at the base, ascending at the tips, usually bifariously pubescent, but sometimes obscurely so. Leaves opposite, close-set, often subimbricate; ¼–½ in. long, oblong or oblong-obovate, obtuse, almost fleshy, smooth and glabrous on both surfaces, margins entire or obscurely denticulate; petioles short, connate at the base. Flowers few, erect, solitary in the axils of the upper leaves, small, ⅓ in. diam., almost sessile, bright-pink. Calyx-segments lanceolate, acute, glabrous. Stigma shortly clavate. Capsules ⅓–¾ in. long, strict, pale-green, perfectly glabrous; peduncles short, equalling the leaves or slightly longer. Seeds ovoid-oblong, minutely papillose.—*Fl. Antarct.* i (1844) 10; *Handb. N.Z. Fl.* (1864) 78 (*as regards the Auckland and Campbell Island specimens*); *Haussk. Monog. Epilob.* (1884) 295; *T. Kirk Students' Fl.* (1899) 171; *Cheesem. Man. N.Z. Fl.* (1906) 175; *Subantarct. Is. N.Z.* ii (1909) 406.

Auckland and Campbell Islands: Meadows and open slopes from sea-level to 1000 ft., *Hooker, T. Kirk! B. C. Aston! R. M. Laing!* and others.

For reasons given in my memoir on the Botany of the Subantarctic Islands, I now confine this species to Hooker's plant figured in the "Icones Plantarum," and also described in the "Flora Antarctica." The New Zealand plants formerly referred to it are better placed under *E. tasmanicum*.

9. **E. tasmanicum** *Haussk. Monog. Epilob.* (1884) 296, t. 20, f. 84.—Usually pale-green, but occasionally reddish, forming broad depressed tufts 2–6 in. diam. Stems 2–6 in. long, creeping and rooting at the base, ascending above, more or less copiously branched, perfectly glabrous, not bifariously pubescent. Leaves spreading, opposite, shortly petiolate, petioles often connate at the base, ovate or ovate-oblong, the uppermost often obovate-oblong, $\frac{1}{4}$–$\frac{1}{3}$ in. long, rarely more, almost entire or obscurely denticulate, somewhat fleshy and frequently shining, midrib scarcely prominent. Flowers few, white or pink, erect, $\frac{1}{5}$–$\frac{1}{4}$ in. long, almost sessile. Calyx-segments lanceolate, glabrous; tube short. Stigma clavate. Capsules glabrous, erect, $\frac{3}{4}$ in. long; peduncles rather shorter than the leaves. Seeds red-brown, minutely papillose.—*T. Kirk Students' Fl.* (1899) 171. E. con-[illegible] *Chessem. Man. N.Z. Fl.* (1906) 176.

EPILOBIUM ELEGANS Petrie

STEMS - slender 2-5 in., with 2 pubescent lines, near glabrous below, decumbent and loopy at base, then erect.

LEAVES - crowded below, cauline more distant, connate, linear or narrow lanceolate ($\frac{1}{2}$ - $\frac{3}{4}$ in. long), shiny and obscurely toothed, thin; medit evident.

FLOWERS - in axils of upper leaves, large, shortly pedicelled; petals deeply lobed, about 27 sepals.

CAPSULES- glabrous, reddish-brown, $\frac{3}{4}$-$1\frac{1}{4}$ in. long, narrowed at apex, peduncles lengthening, up to 2 in. long.

SEEDS - Smooth.

Mt. Kyeburn.
Naseby
Spear-grass flat
Mt. Torlesse
300-3000 ft.
"Close to E. confertifolium"

very lowest subopposite, the remainder alternate, lanceolate or linear-lanceolate, acute, upper portion armed with irregularly placed remote denticles, lower part entire, both surfaces densely covered with spreading hairs, midrib prominent beneath, villous. Flowers erect, rather small, ¼ in. long. Calyx-segments lanceolate, acute; tube short, villous. Petals purplish, slightly longer than the calyx. Stigma capitate-clavate. Capsule 2–3 in. long, straight or curved, densely villous; peduncle very short, many times shorter than the capsule. Seeds ovoid-oblong, red-brown, densely papillose.—*Raoul Choix* (1846) 49; *Haussk. Monog. Epilob.* (1884) 291. E. junceum *var.* hirtigerum *Hook. f. Fl. Nov. Zel.* i (1853) 60; *Handb. N.Z. Fl.* (1864) 80; *T. Kirk Students' Fl.* (1899) 169; *Cheesem. Man. N.Z. Fl.* (1906) 175.

North and South Islands: Abundant from the North Cape southwards to Westland and South Canterbury. Sea-level to 2000 ft. November–March.

Further study of this plant has fully convinced me that Haussknecht was fully justified in maintaining it as a distinct species. Its distinguishing characters are the tall strict habit, usually greyish-green colour, dense clothing of villous spreading hairs mixed with shorter ones, the small flowers, and very short peduncles. According to Haussknecht it is not uncommon in south-eastern Australia and Tasmania.

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Auckland and Campbell Islands: Meadows and open slopes from sea-level to 1000 ft., *Hooker, T. Kirk! B. C. Aston! R. M. Laing!* and others.

For reasons given in my memoir on the Botany of the Subantarctic Islands, I now confine this species to Hooker's plant figured in the "Icones Plantarum," and also described in the "Flora Antarctica." The New Zealand plants formerly referred to it are better placed under *E. tasmanicum.*

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South Island: Nelson—Lake Rotoiti, *T. Kirk!* Wairau Gorge, Upper Clarence Valley, *T. F. C.* Canterbury—Craigieburn Mountains, *Cockayne!* mountains above the Broken River, *T. F. C.;* Mount Peel district, *H. H. Allan;* Mount Dobson Range, *T. F. C.* Otago—Not uncommon on the central and western mountains, *Petrie!* Mount Alta, *Buchanan!* Rock and Pillar Range, *A. Wall!* mountains at the head of Lake Wanaka, Ben Ohau Range, *Cockayne!* 1500–5500 ft. December–February.

T. 47 (1915) 138.

This is very close to the preceding, from which it is mainly distinguished by its smaller size, by the stems not being distinctly bifariously pubescent, by the leaves being rather broader, smaller, and not so closely placed, and by the paler colour. Whether it is really identical with the Tasmanian *E. tasmanicum* is a matter that cannot be settled without the comparison of specimens from both countries. I have seen no specimens that exactly match Haussknecht's plate of the Tasmanian plant.

10. **E. pictum** *Petrie in Trans. N.Z. Inst.* xxviii (1896) 538.—Stems few, slender, 8–10 in. high, decumbent and sparingly branched below, ascending or erect above, terete, finely and evenly pubescent, especially towards the tips of the branches. Lower leaves opposite, upper alternate, spreading, remote, $\frac{1}{2}$–$\frac{3}{4}$ in. long, linear-oblong to oblong or ovate-oblong, obtuse, sessile or shortly petioled, membranous, often blotched with grey, usually sharply and coarsely remotely denticulate. Flowers 2–6 towards the tips of the branches, small, pink, $\frac{1}{5}$ in. diam. Calyx-lobes ovate-lanceolate, almost equalling the petals. Stigma narrow-clavate. Capsules 1–1$\frac{1}{2}$ in. long, slender, densely and evenly hoary-pubescent; peduncles short, never exceeding the leaves. Seeds smooth.—*Cheesem. Man. N.Z. Fl.* (1906) 176. E. haloragifolium *T. Kirk Students' Fl.* (1899) 177 (*not of A. Cunn.*).

South Island: Marlborough—Tinline Valley, *J. H. Macmahon!* Nelson—Mount Isabel, Hanmer, *Cockayne;* Mount Percival, *T. F. C.;* Lake Tennyson, *R. M. Laing.* Canterbury—Riccarton Bush, *Cockayne;* Banks Peninsula, *A. Wall;* Mount Peel, *H. H. Allan!* Upper Waimakariri, *T. Kirk!* Craigieburn Mountains, *Cockayne!* Bealey, *T. F. C.;* Lake Tekapo, Hooker and Tasman Valleys, *T. F. C.* Otago—Mountain-valleys in Central Otago, not uncommon, *Petrie!* Stewart Island: *Cockayne.* Sea-level to 3500 ft. December–February.

This is a distinct species, easily separable by the slender sparingly branched stems, narrow-oblong leaves, which are often peculiarly blotched or variegated with grey, long slender capsules, which are finely and evenly pubescent, and by the smooth seeds.

Professor Haussknecht has suggested that it may be identical with Cunningham's *E. haloragifolium* (Precur. n. 552), an obscure plant gathered near the Waikare River, Bay of Islands, and this view has been adopted by Kirk in the "Students' Flora." But Cunningham's original description is so short and incomplete that it might stand for several species, and *E. pictum* has not yet been found in any locality in the North Island. Hooker referred *E. haloragifolium* to *E. alsinoides*, a plant not uncommon at the Bay of Islands, and it appears to me that this reduction is much more likely to prove correct.

11. **E. tenuipes** *Hook. f. Fl. Nov. Zel.* i (1853) 59.—Stems short, slender, 1–4 in. long, decumbent and rooting at the base, ascending at the tips, bifariously pubescent. Leaves opposite or alternate, crowded, rigid, erecto-patent, $\frac{1}{5}$–$\frac{1}{2}$ in. long, narrow linear-oblong, lower ones obtuse, upper acute, narrowed at the base, glabrous, remotely denticulate or almost entire. Flowers few, solitary in the axils of the upper leaves or terminal, small, white, $\frac{1}{6}$ in. diam. Calyx-lobes lanceolate, acuminate. Capsules slender, $\frac{3}{4}$–1 in. long, glabrous or puberulous; peduncles much elongated, very slender, 2–3 in. long, finely pubescent. Seeds smooth.—*Haussk. Monog. Epilob.* (1884) 297; *T. Kirk Students' Fl.* (1899) 171; *Cheesem. Man. N.Z. Fl.* (1906) 177. R. nanum *Col. in Trans. N.Z. Inst.* xxvi (1894) 315.

North Island: Dannevirke (Hawke's Bay) and head of the Wairarapa Valley, *Colenso!* Kaimanawa and Ruahine Mountains, *B. C. Aston!* Mount Hector, *Petrie.* South Island: Damp situations in mountain districts from Nelson southwards, not uncommon. 500–3500 ft. January–March.

A pretty little plant, easily distinguished by the narrow linear-oblong erect leaves, very long fruiting-peduncles, and smooth seeds. Specimens collected by Mr. Petrie on Mount Hikurangi (East Cape district) have much broader ovate-oblong leaves, but the long fruiting-peduncles and smooth seeds are those of *E. tenuipes.*

12. **E. Hectori** *Haussk. Monog. Epilob.* (1884) 298, t. 19, f. 82.—Stems slender, branched below, 2–6 in. high, decumbent and rooting at the base and then erect or ascending, pale-green or reddish, terete, uniformly clothed with short crisp hairs or bifariously pubescent. Leaves small, opposite, uppermost alternate, crowded or distant, $\frac{1}{4}$–$\frac{1}{2}$ in. long, oblong or linear-oblong, obtuse, entire or remotely denticulate, usually glabrous. Flowers in the axils of the uppermost leaves, small, erect, $\frac{1}{5}$–$\frac{1}{4}$ in. diam., white. Calyx-lobes ovate-lanceolate, acute, shorter than the petals. Stigma clavate. Capsules $\frac{1}{2}$–1 in. long, purplish-red, obscurely tetragonous, usually pubescent on the angles, rarely glabrous; peduncles much longer than the leaves. Seeds smooth.—*T. Kirk Students' Fl.* (1899) 172; *Cheesem. Man. N.Z. Fl.* (1906) 177.

North Island: Ruahine Mountains, locality not stated, *Colenso!* river-flats, *B. C. Aston;* Tararua Mountains, Mount Hector, *Petrie!* South Island: Nelson—Mount Arthur Plateau, *T. F. C.;* Hanmer, *T. Kirk.* Canterbury—Waiau Valley, *Hector;* locality not stated, *Haast.* Otago—Apparently not uncommon in mountain-valleys in the central and western portion of the district, *Petrie!* Haast River and Makaroro, *Poppelwell;* Takitimu Mountains, *Crosby Smith.*

Often confounded with *E. alsinoides*, from which it is separated by the much more erect habit, narrower leaves, purplish-red capsules with hairy lines, and smooth seeds. The capsule of *E. alsinoides* is always evenly covered with a grey pubescence.

13. **E. alsinoides** *A. Cunn. Precur.* (1839) n. 540.—Stems 4–10 in. long, pale-green, slender, branched, decumbent or creeping and rooting at the base, erect or ascending above, terete, pubescent or more rarely glabrous. Leaves all opposite or the uppermost alone alternate, very shortly petioled, $\frac{1}{3}$–$\frac{1}{2}$ in. long, orbicular or orbicular-ovate or oblong-ovate, obtuse, rounded at the base, glabrous, entire or remotely denticulate. Flowers few in the upper axils, small, erect, $\frac{1}{5}$ in. diam. Calyx-lobes ovate-lanceolate, acute, almost equalling the petals. Stigma clavate. Capsules $\frac{3}{4}$–$1\frac{1}{2}$ in. long, uniformly clothed with pale-grey pubescence; peduncles elongating much as the fruit ripens, 1–2 in. long or more. Seeds papillose.—*Raoul Choix* (1846) 49; *Hook. f. Fl. Nov. Zel.* i (1853) 59; *Handb. N.Z. Fl.* (1864) 79; *Haussk. Monog. Epilob.* (1884) 298, t. 23, f. 97. *T. Kirk Students' Fl.* (1899) 172; *Cheesem. Man. N.Z. Fl.* (1906) 177. E. thymifolium *R. Cunn. ex A. Cunn. Precur.* (1839) n. 539; *Haussk. l.c.* 297.

North and South Islands, Chatham Islands, Stewart Island, Antipodes Island: Abundant throughout, ascending to 2500 ft. November–February.

The small size and slender often prostrate habit, uniform roundish pale-green leaves, small flowers collected near the ends of the branches, long peduncles, and evenly pubescent capsules are the best marks of this common plant.

14. **E. Cockaynianum** *Petrie in Trans. N.Z. Inst.* xli (1909) 140.—Stems tufted, slender, somewhat flaccid, 5–10 in. long, usually decumbent and rooting at the base, erect or ascending above, pale-green or reddish towards the base, terete or obscurely tetragonous above, usually bifariously pubescent but frequently uniformly pubescent above. Leaves opposite or the uppermost alternate, broadly ovate or ovate-oblong, shortly petiolate or almost sessile, $\frac{1}{6}$–$\frac{1}{3}$ in. long, obtuse at the tip, rounded at the base, glabrous, minutely but sparsely denticulate. Flowers few in the axils of the uppermost leaves, small, $\frac{1}{6}$ in. diam. Calyx-segments lanceolate, acute. Petals white or white tinged with rose. Capsules 1–2 in. long, brownish-red, glabrous or nearly so; peduncles when mature as long or longer than the capsules, reddish, faintly puberulous. Seeds glabrous.

North Island: Tararua Mountains, Mount Holdsworth, *Petrie! W. Townson;* Mount Hector, *Petrie! B. C. Aston!* Altitudinal range 3000–5000 ft. December–February.

Very close to *E. alsinoides*, but differing in the less prostrate and more glabrous stems, more truly ovate and more distinctly denticulate leaves, and in the almost glabrous capsules and smooth seeds.

15. **E. chloraefolium** *Haussk. in Oestr. Bot. Zeitschr.* xxix (1879) 149.—Stems 6–18 in. high, stout or slender, usually much branched at the base but sometimes almost simple, decumbent or arcuate below, ascending or erect above, terete, glabrous except two pubescent lines decurrent from the margins of the petioles. Leaves opposite, remote, $\frac{1}{3}$–$\frac{3}{4}$ in. long, broadly ovate to ovate-oblong, obtuse or rarely subacute, rounded or slightly cordate at the base, glabrous or nearly so, remotely denticulate or sinuate-toothed; petioles short, broad, pubescent. Flowers in the axils of the uppermost leaves, rather large, white or rose, $\frac{1}{3}$ in. diam. Calyx-lobes ovate-lanceolate, acute, much shorter than the petals; stigma oblong-capitate. Capsules 1–2 in. long, sparsely pubescent; peduncles longer than the leaves. Seeds papillose.—*Monog. Epilob.* (1884) 299, t. 19, f. 81; *T. Kirk Students' Fl.* (1899) 172; *Cheesem. Man. N.Z. Fl.* (1906) 178; *Ill. N.Z. Fl.* i (1914) 54. E. perplexum *T. Kirk l.c.* 170.

var. verum Cock. T. 50 (1918) 170.

Var. **kaikourense** *Cockayne in Trans. N.Z. Inst.* 1 (1918) 170.—Much more robust. Flowers more than twice the size of the type.

North Island: Subalpine districts from Mount Egmont, Hikurangi, and the Ruahine Mountains southwards to Cook Strait, not uncommon. South Island: A most abundant subalpine plant from Nelson southwards to Foveaux Strait. 1500–4500 ft. December–February. Var. *kaikourense:* Marlborough District, from the Kaikoura Peninsula northwards to the Awatere River, and extending westward almost as far as Hanmer. Sea-level to 2500 ft.

E. chloraefolium is a distinct and well-marked species, but at the same time a very variable one, especially in height, degree of branching, size of flowers and capsules, &c. Dr. Cockayne's var. *kaikourense* is a very remarkable plant, well worth varietal distinction, although there does not seem to be any structural differences between it and what may be called the type. Students should read with care Dr. Cockayne's account of the variety, given in Trans. N.Z. Inst. vol. 1 (1918) 170.

16. **E. Wilsoni** *Petrie in Trans. N.Z. Inst.* liv (1923) 569.—Stems several from the top of the root, 9–12 in. long, simple or sparingly branched, decumbent at the base, erect or ascending above, slender, terete, bifariously pubescent or almost glabrous below, more or less evenly pubescent above, dark-red. Leaves ½–1 in. long including the petiole, ¼–⅓ in. broad, shortly petiolate, all opposite or the uppermost alternate, spreading, oblong-lanceolate to oblong-ovate, usually obtuse at the tip, thin and membranous, faintly puberulous or nearly glabrous, faintly and remotely sinuate-dentate, midrib and veins usually evident. Flowers not very numerous, springing from the axils of the uppermost leaves, large, ¼–½ in. diam., apparently white. Calyx-segments linear-lanceolate, acute, thin and glabrous. Petals twice as long as the calyx, broadly obcordate. Mature peduncles ½–¾ in. long, slender, thinly pubescent. Capsules ¾–1¼ in. long, slender, sparsely but evenly pubescent. Seeds papillose, narrowed upwards, one side almost flat, the other distinctly ridged.

var. pallidum S&T. 70 (1940) 30.

South Island: Marlborough—Isolated hill-peak, Clarence Valley, *B. C. Aston.*

A very distinct species, not closely allied to any other. Mr. Petrie compares it with *E. chloraefolium;* but it differs altogether in the position and texture of the leaves, which are distinctly petioled, and in the shorter and much more slender capsules.

17. **E. insulare** *Haussk. Monog. Epilob.* (1884) 300.—Stems 6–18 in. high, slender, weak and flaccid, sparingly branched, creeping and rooting at the base, ascending or suberect towards the tips, often glabrous below, usually thinly pubescent above. Leaves opposite, the upper alternate, distant, ½–¾ in. long, ovate or oblong-ovate, obtuse or subacute, very shortly petioled, thin and membranous, glabrous or nearly so, entire or obscurely sinuate-toothed. Flowers in the axils of the uppermost leaves, small, erect, white. Calyx-lobes oblong-lanceolate, apiculate, shorter than the petals. Stigma clavate. Capsules 1–2 in. long, slender, pubescent or glabrate. Seeds smooth.—*T. Kirk Students' Fl.* (1899) 173; *Cheesem. Man. N.Z. Fl.* (1906) 178.

North and South Islands, Stewart Island, Chatham Islands: Not uncommon in lowland swamps from Tauranga and the Thames Valley southwards. Sea-level to 1500 ft. November–February.

A distinct species, easily distinguished by the weak tall and slender habit, distant ovate-oblong leaves, faintly pubescent capsules, and perfectly smooth seeds.

18. **E. rotundifolium** *Forst. f. Prodr.* (1786) n. 161.—Stems 5–15 in. long, weak, creeping and rooting at the base, usually erect or ascending above but sometimes altogether prostrate, terete, pubescent or glabrous. Leaves opposite, the uppermost alternate, thin and membranous, distant, $\frac{1}{3}$–$\frac{3}{4}$ in. long, orbicular or orbicular-ovate, obtuse, rounded at the base, petiolate, closely and sharply unequally toothed, glabrous or slightly puberulous, often reddish beneath. Flowers in the axils of the uppermost leaves, $\frac{1}{6}$–$\frac{1}{4}$ in. diam., pale-rose or white. Calyx-lobes oblong-lanceolate, acute, shorter than the petals. Stigma narrow-clavate. Capsules about $1\frac{1}{2}$ in. long, glabrous or sparingly pubescent; peduncles much elongated. Seeds papillose.—*A. Rich. Fl. Nouv. Zel.* (1832) 326; *Raoul Choix* (1846) 49; *Hook. f. Fl. Nov. Zel.* i (1853) 58; *Handb. N.Z. Fl.* (1864) 79; *Haussk. Monog. Epilob.* (~~1844~~) 299; *T. Kirk Students' Fl.* (1899) 172; *Cheesem. Man. N.Z. Fl.* (1906) 179; *Ill. N.Z. Fl.* ii (1914) t. 52.

1884.

North and South Islands, Stewart Island, Chatham Islands: Moist shaded localities from the North Cape to Stewart Island, abundant. Sea-level to 3500 ft. October–February.

Allied to *E. linnaeoides*, but at once recognized by the more erect habit, by the uppermost leaves being always alternate, and by the terminal inflorescence. From *E. insulare* it is separated by the larger rounder sharply toothed petiolate leaves and papillose seeds.

19. **E. linnaeoides** *Hook. f. Fl. Antarct.* i (1844) 10, t. 6.—Stems herbaceous, slender, 2–8 in. long, creeping and rooting at the nodes, usually widely and irregularly branched, perfectly glabrous or with 2 faint pubescent lines towards the tips of the branches. Leaves opposite, $\frac{1}{4}$–$\frac{1}{2}$ in. diam., orbicular, petioled, flaccid and membranous, closely and sharply denticulate. Flowers in the axils of leaves remote from the ends of the branches, white or rose, $\frac{1}{6}$–$\frac{1}{4}$ in. diam. Calyx-lobes lanceolate, shorter than the deeply cleft petals. Stigma clavate. Capsules 1–2 in. long, perfectly glabrous; peduncles usually much elongated, 2–4 in. Seeds densely papillose.—*Fl. Nov. Zel.* i (1853) 58; *Handb. N.Z. Fl.* (1864) 77; *Haussk. Monog. Epilob.* (1884) 301; *Cheesem. Man. N.Z. Fl.* (1906) 179; *Subantarct. Is. of N.Z.* ii (1909) 406; *Fl. Macquarie Is.* (1919) 25.

North Island: Damp shaded mountainous places. Mount Egmont, *Cockayne;* Mount Ruapehu, *Cockayne, T. F. C.;* Ruahine Mountains, *Colenso;* Tararua Mountains, *Buchanan, Petrie.* South Island: Not uncommon in damp mountainous places, chiefly on the western side. Stewart Island, Auckland and Campbell Islands, Antipodes Island, Macquarie Island: Not uncommon throughout. Sea-level to 4500 ft. November–February.

Approaches very close to *E. rotundifolium*, but can usually be separated by the smaller size, prostrate habit, leaves all opposite and uniform, and by the flowers being farther from the ends of the branches. Hooker's plate in the "Flora Antarctica" is excellent.

20. **E. nummularifolium** *R. Cunn. ex A. Cunn. Precur.* (1839) n. 535.—A small densely tufted herbaceous plant, spreading flat over the surface of the ground. Stems slender, elongated, creeping and rooting at the nodes, 3–8 in. long, rarely more, sometimes ascending towards the tips, dull-green or reddish, obscurely tetragonous, faintly bifariously pubescent but otherwise glabrous, sparingly branched; branchlets short, rooting. Leaves appressed to the ground, opposite, remote, petiolate, orbicular, subcordate or truncate at the base, rounded at the apex, variable in size, $\frac{1}{6}$–$\frac{1}{2}$ in. long including the petiole, fleshy, glabrous, dull-green above, paler

beneath, margins somewhat revolute when dry, obscurely and remotely denticulate, midrib not prominent, secondary nerves obscure. Flowers few, springing from the axils of leaves remote from the ends of the stems, small, erect, $\frac{1}{8}$–$\frac{1}{6}$ in. diam. Calyx-segments ovate-lanceolate, almost equalling the petals, subobtuse, almost glabrous, petals pale, scarcely longer than the calyx. Stigma clavate. Mature capsules $\frac{3}{4}$–$1\frac{1}{2}$ in. long, erect, more or less clothed with fine ashy-grey pubescence; peduncles long, erect, 2–4 in. long, usually thinly pubescent. Seeds ovoid-oblong; testa thinly papillose.—*Hook. f. Fl. Nov. Zel.* i (1853) 57; *Handb. N.Z. Fl.* (1864) 77 (*in part*); *Haussk. Monog. Epilob.* (1884) 302, t. xxii, f. 94; *T. Kirk Students' Fl.* (1899) 173 (*in part*); *Cheesem. Man. N.Z. Fl.* (1906) 180 (*in part*). E. caespitosum *Haussk. l.c.* (1884) 301, t. xx, f. 85.

North and South Islands: Abundant from the North Cape to Foveaux Strait, usually in lowland districts.

In the first edition of this work I included the closely related *E. pedunculare* and *E. nerterioides* in my conception of this species. The differences between the three plants, though small, appear to be constant, and are pointed out under *E. pedunculare.*

21. **E. pedunculare** *A. Cunn. Precur.* (1839) n. 536.—A small densely tufted herbaceous plant, often forming matted patches of considerable size. Stems pale-green or tinged with reddish-purple, the younger faintly bifariously pubescent but at length glabrous, 3–8 in. long; branchlets short, sometimes ascending at the tips. Leaves opposite, crowded, ovate to orbicular-ovate, contracted at the base into a very short petiole, $\frac{1}{8}$–$\frac{1}{3}$ in. long, glabrous, coriaceous, pale-green but often tinged with red beneath, entire or provided with a few minute denticles, midrib prominent beneath, secondary veins not conspicuous. Flowers remote from the ends of the branches, few, small, erect. Petals white or pale-rose. Calyx-segments ovate-lanceolate, acute, glabrous. Stigma clavate. Mature capsules erect, glabrous, pale-green or purplish-red, $\frac{1}{2}$–$1\frac{1}{2}$ in. long. Peduncles long, erect, $1\frac{1}{2}$–4 in. long, glabrous. Seeds obovate-oblong; testa densely papillose. —*Haussk. Monog. Epilob.* (1884) 303, t. 23, f. 96A. E. nummularifolium *var.* pedunculare *Hook. f. Fl. Nov. Zel.* i (1853) 58; *Handb. N.Z. Fl.* (1864) 77; *T. Kirk Students' Fl.* (1899) 173; *Cheesem. Man. N.Z. Fl.* (1906) 180.

Var. **brunnescens** *Cockayne in Trans. N.Z. Inst.* l (1918) 171.—Stems pale-green, tinged with brown. Leaves ovate-oblong or rounded oblong, above pale-green tinged with brown, purplish beneath. Capsules glabrous, pale-brown, 1–3 in. long. Peduncles 3–4 in. long. Barely separable as a variety.

Var. **viride** *Cockayne in Trans. N.Z. Inst.* l (1918) 173.—Stems and leaves pale-green. Peduncles very short, $\frac{1}{4}$–$\frac{1}{2}$ in. long. Flowers and capsules smaller than in the type.

Var. **minutiflorum** *Cockayne in Trans. N.Z. Inst.* l (1918) 172.—Stems slender, reddish-purple. Leaves bright-green, small, $\frac{1}{6}$–$\frac{1}{4}$ in. long. Flowers white, small. Peduncles short, $\frac{3}{4}$–$1\frac{1}{4}$ in. long. Capsules purplish. A very distinct variety.

North and South Islands, Stewart Island: Abundant from the North Cape to Stewart Island. Altitudinal range from sea-level to 3500 ft. Var. *brunnescens:* Mount Egmont, *Cockayne!* South Canterbury, *A. Wall.* Var. *viride:* North Island, Fairburn, Mongonui County, *H. Carse!* Var. *minutiflorum:* Broken River basin, *A. Wall;* river-bed of the Rakaia River and vicinity of Mount Peel, *H. H. Allan!*

This species, which is one of the most variable in the New Zealand Flora, is closely allied on one side to *E. nummularifolium,* and on the other to *E. nerterioides.* From the first it is best distinguished (as has been pointed out by Haussknecht) by the more slender stems; by the smaller and thicker leaves, which have much shorter petioles, and nearly entire margins; and by the more slender peduncles and glabrous capsules. *E. nerterioides* can be separated by the smaller average size, more densely matted habit, and by the smaller and more coriaceous leaves, which are often conspicuously rugose.

22. **E. nerterioides** *A. Cunn. Precur.* (1839) n. 541.—Usually forming small densely matted patches closely appressed to the surface of the ground. Stems shorter and firmer than in the two preceding species, green or reddish, usually glabrous, but sometimes faintly bifariously pubescent near the apices, 1–5 in. long, rarely more, branchlets numerous. Leaves opposite, crowded, broadly elliptical or ovate to orbicular, obtuse, shortly petiolate or almost sessile, $\frac{1}{10}$–$\frac{1}{4}$ in. long, glabrous, coriaceous or almost fleshy, green or reddish, under-surface often rugulose, margins entire or faintly denticulate, midrib conspicuous. Flowers few, remote from the ends of the branches, small, erect, white or pale-rose. Calyx-segments ovate-lanceolate, acute, not much shorter than the petals. Stigma clavate. Mature capsules erect or inclined, glabrous or more rarely faintly pubescent, $\frac{1}{2}$–1 in. long, rarely more. Peduncles slender, glabrous, 1–$2\frac{1}{2}$ in. long. Seeds obovate-oblong, testa densely papillose.—*Hook. f. Fl. Antarct.* i (1844) 11. E. nummularifolium *var.* nerterioides *Hook. f. Fl. Nov. Zel.* i (1853) 58; *Handb. N.Z. Fl.* (1864) 77; *T. Kirk Students' Fl.* (1899) 174; *Cheesem. Man. N.Z. Fl.* (1906) 180. E. pedunculare *var.* aprica *Haussk. Monog. Epilob.* (1884) 303.

Var. **minimum** *Cockayne in Bot. Surv. Stewart Id.* (1909) 43.—Stems small, $\frac{1}{2}$–$1\frac{1}{2}$ in. long. Leaves close-set, opposite, $\frac{1}{10}$–$\frac{1}{8}$ in. diam., sessile or nearly so, coriaceous, glabrous, rugose; midrib and veins conspicuous. Capsule $\frac{1}{4}$–$\frac{1}{3}$ in. long, exceeding the peduncle, fusiform, deeply grooved. — E. pedunculare *var.* minimum *T. Kirk Students' Fl.* (1899) 174.

T. 75: 181.

Var. **angustum** *Cheesem.* — Stems 2–4 in. long, sparingly branched. Leaves remote, often deflexed, oblong to linear-oblong, entire or nearly so, hardly coriaceous. Capsules rather stout, $\frac{1}{2}$–$\frac{3}{4}$ in. long, glabrous or with a few scattered hairs; peduncles long. Perhaps a distinct species.

North and South Islands, Chatham Islands, Stewart Island, Auckland and Campbell Islands, Macquarie Island: Abundant from the Three Kings Islands and the North Cape southwards. Sea-level to 3500 ft. November–March. Var. *minimum:* Bluff Hill and Puysegur Point, *T. Kirk!* Stewart Island, not uncommon, *Cockayne.* Var. *angustum:* Cass River, near Lake Tekapo (Canterbury), *T. F. C.*

The most widely distributed species of the genus in New Zealand, stretching through the whole length of the Dominion except the Kermadec Islands. Its distinguishing characters are the small size, crowded and almost uniform coriaceous glabrous leaves, and short glabrous capsules.

23. **E. purpuratum** *Hook. f. Handb. N.Z. Fl.* (1864) 77.—Stems 1–4 in. long, branched, prostrate and rooting at the nodes, perfectly glabrous, purplish-black. Leaves all opposite, crowded, horizontally spreading, $\frac{1}{4}$–$\frac{1}{2}$ in. long, broadly oblong or orbicular-oblong, obtuse, shortly petioled, thick and coriaceous, entire or obscurely minutely toothed, purplish below; veins indistinct. Flowers not seen. Peduncles springing from the axils of the intermediate leaves, stout, 2 in. long. Capsules as long as or shorter than the peduncles, stout, purplish-black, perfectly glabrous. Seeds papillose.—*Haussk. Monog. Epilob.* (1884) 303; *Barbey Gen. Epilob.* (1885) t. 18, f. 2; *T. Kirk Students' Fl.* (1899) 174; *Cheesem. Man. N.Z. Fl.* (1906) 180.

South Island: Alps of Otago, altitude 4000–6000 ft., *Hector* and *Buchanan!*

Distinguished from all the forms of *E. nummularifolium* and *E. pedunculare* by the larger size, stouter habit, and purplish-black colour. I have only seen three indifferent specimens, but so far as they go they suit Barbey's beautifully executed plate very well.

24. **E. macropus** *Hook. Ic. Plant.* (1852) t. 812.—Stems numerous, slender, branched from the base, 3–9 in. long, decumbent or creeping and rooting below, ascending at the tips, purplish, more or less bifariously pubescent. Leaves all opposite, somewhat remote, ¼–¾ in. long, ovate or ovate-oblong, obtuse or subacute, shortly petioled, obscurely denticulate or almost entire, perfectly glabrous. Flowers few, axillary, near or remote from the ends of the branches, large, white, ¼–⅓ in. diam. Calyx-lobes lanceolate, acute, glabrous, much shorter than the petals. Stigma shortly clavate, emarginate. Capsules 1–2 in. long, erect, glabrous; peduncles elongating much as the fruit ripens, 2–4 in. long. Seeds minutely reticulate.—*Hook. f. Fl. Nov. Zel.* i (1853) 58; *Handb. N.Z. Fl.* (1864) 78; *Haussk. Monog. Epilob.* (1884) t. 22, f. 93A; *T. Kirk Students' Fl.* (1899) 179; *Cheesem. Man. N.Z. Fl.* (1906) 180.

North Island: Not uncommon in running water on the volcanic plateau between Tongariro and Ruapehu, *Petrie, Cockayne, T. F. C.;* Ruahine Mounatins, *E. W. Andrews! Petrie! B. C. Aston!* Tararua Mountains and Wainuiomata, *Buchanan.* South Island: Abundant in watery places in mountain districts throughout. Altitudinal range 1500–4500 ft. December–March.

The slender glabrous habit, distant ovate leaves, large flowers, and long fruiting-peduncles separate this from all its allies.

25. **E. gracilipes** *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 351.—Stems numerous from a woody base, 3–6 in. high, decumbent below, erect or ascending above, wiry, reddish, bifariously pubescent. Leaves opposite or the uppermost alternate, remote, ¼–⅔ in. long, ovate, subacute or obtuse, shortly petiolate, coriaceous, reddish below, obscurely and remotely denticulate. Flowers 1–3, solitary in the upper axils, small, white, ⅕ in. diam. Calyx-lobes oblong-lanceolate, acute, shorter than the petals. Stigma obliquely clavate. Capsules 1½–2 in. long, slender, glabrous; peduncles elongating much as the fruit ripens, often over 2 in. long. Seeds minutely papillose.—*Cheesem. Man. N.Z. Fl.* (1906) 181.

South Island: Nelson—Cobb Valley, north-west Nelson, *F. G. Gibbs!* Canterbury—Bealey, *T. F. C.;* Craigieburn Mountains, *Cockayne!* Broken River basin, *J. D. Enys! T. Kirk!* Westland—Kelly's Hill, *Cockayne!*

A handsome little plant, which approaches *E. macropus* on the one side and *E. nummularifolium* on the other.

26. **E. crassum** *Hook. f. Fl. Nov. Zel.* ii (1855) 328.—Stout, fleshy, perfectly glabrous, smooth and polished. Stems woody at the base, prostrate, creeping and rooting at the nodes, 2–6 in. long; branches short, densely leafy, ascending at the tips. Leaves opposite, crowded, thick and fleshy, ¾–1½ in. long, obovate-oblong or obovate-spathulate, obtuse, gradually narrowed into a long and broad sheathing petiole, obscurely and remotely denticulate. Flowers few, in the axils of the upper leaves, rather large, ⅓ in. diam. or more, white or rose. Calyx-lobes lanceolate, much shorter than the petals. Stigma clavate. Capsules stout, erect, rigid, perfectly glabrous, 1½–2 in. long; peduncles longer than the leaves when fully mature. Seeds minutely papillose.—*Handb. N.Z. Fl.* (1864) 78; *Haussk. Monog. Epilob.* (1884) 309, t. 22, f. 93A; *Barbey Gen. Epilob.* (1885) t. 18, f. 1; *T. Kirk Students' Fl.* (1899) 178; *Cheesem. Man. N.Z. Fl.* (1906) 181.

South Island: Nelson—Wairau Mountains, *W. T. L. Travers, T. F. C.;* Mount Captain, *T. Kirk!* Mount Percival, *T. F. C.;* Lake Tennyson, *R. M. Laing.* Marlborough—Upper Awatere, *Monro, Sinclair!* Otago—Kurow Mountains, *Buchanan! Petrie!* Altitudinal range 3000–6000 ft.

A remarkably distinct species, in its ordinary state quite unlike any other. Its nearest ally is *E. brevipes*, which is a much larger and more erect plant, with shorter elliptic leaves, smaller and more numerous flowers, and much shorter fruiting-peduncles.

27. **E. brevipes** *Hook f. Fl. Nov. Zel.* ii (1855) 328.—Stout, smooth, glossy, reddish-purple. Stems many from a woody rhizome, 6–15 in. high, prostrate or straggling, branched, ascending above, perfectly glabrous, densely leafy. Leaves all opposite, spreading, $\frac{3}{4}$–1 in. long, elliptic-oblong or elliptic-lanceolate, acute or subacute, gradually narrowed into a rather long petiole, coriaceous and shining, usually reddish, remotely denticulate. Flowers rather numerous, in the axils of the upper leaves, sessile, $\frac{1}{4}$–$\frac{1}{3}$ in. diam., white or rose. Calyx-lobes lanceolate, acute, almost equalling the petals. Stigma clavate. Capsules $\frac{3}{4}$–$1\frac{1}{4}$ in. long, slender, glabrous, exceeding the leaves; peduncles very short, hardly elongating in fruit. Seeds minutely reticulate.—*Handb. N.Z. Fl.* (1864) 78; *Haussk. Monog. Epilob.* (1884) 307, t. 21, f. 89; *T. Kirk Students' Fl.* (1899) 176; *Barbey Gen. Epilob.* (1885) t. 19; *Cheesem. Man. N.Z. Fl.* (1906) 182; *Ill. N.Z. Fl.* i (1914) t. 53.

South Island: Usually on rock-faces. Marlborough—From the Wairau and Awatere Valleys southwards, not uncommon, *Monro! T. Kirk! Cockayne! B. C. Aston;* Taylor's Pass, *Spencer!* Mount Fyfe, *Cockayne, H. J. Matthews.* Nelson—St. Arnaud Mountains and the Wairau Gorge, *Cockayne* and *Foweraker;* Waiau Gorge, *H. J. Matthews!* Canterbury—Mount Torlesse, *J. D. Enys, T. Kirk, T. F. C., Cockayne;* gorge of the Broken River, *Cockayne.* Altitudinal range 1000–4000 ft. December–February.

A perfectly distinct species, easily distinguished by the hard and woody base, the perfectly glabrous densely leafy stems, smooth and shining elliptic leaves, and the glabrous capsules, borne on very short peduncles. Its nearest ally is probably *E. crassum.*

28. **E. vernicosum** *Cheesem. in Trans. N.Z. Inst.* xxviii (1896) 535.—Stems numerous from a woody rootstock, 4–8 in. high, decumbent or prostrate at the base, erect or ascending above, terete, bifariously pubescent. Leaves usually crowded, opposite or the uppermost alternate, $\frac{1}{4}$–$\frac{3}{4}$ in. long, linear-oblong to oblong or oblong-ovate, obtuse or subacute, shortly petiolate, coriaceous, very glossy, usually reddish, obscurely and remotely sinuate-denticulate. Flowers 3–5 towards the tips of the branches, almost sessile, very large, $\frac{1}{3}$–$\frac{2}{3}$ in. diam., pale-rose. Calyx-lobes lanceolate, acute, much shorter than the broad bilobed petals. Stigma shortly and obliquely clavate. Capsules (not quite mature) about 1 in. long, perfectly glabrous; peduncles apparently short. Seeds smooth (?)—*T. Kirk Students' Fl.* (1899) 176; *Cheesem. Man. N.Z. Fl.* (1906) 182.

South Island: Nelson—Mount Arthur Plateau and adjacent mountains, altitude 3000–5000 ft., *T. F. C., F. G. Gibbs!* Mount Owen, *T. F. C., W. Townson!* Raglan Mountains and Wairau Gorge, *T. F. C.* Otago—Arrowtown, *Petrie!*

The shining leaves and large rose-coloured flowers, which are produced in great abundance, make this a very charming plant. The flowers are larger than those of any other New Zealand species except *E. pallidiflorum.*

29. **E. rubromarginatum** *Cockayne in Trans. N.Z. Inst.* xlviii (1916) 195.—Stems 3–6 in. long, few or many, simple or branched, hard and almost woody at the base, prostrate and rooting below, more or less ascend-

ing or arcuate above, bifariously pubescent or almost glabrous, usually more or less tinged with red. Leaves small, densely crowded, $\frac{1}{4}$–$\frac{1}{3}$ in. long, shortly petioled, opposite, linear-oblong to oblong or oblong-ovate, more or less distichous, glabrous or with a few scattered hairs on the petioles, obtuse, fleshy, margins with a conspicuous purplish-red line, obscurely and remotely denticulate, midrib prominent beneath. Flowers few towards the tips of the branches, white or pale-rose, $\frac{1}{5}$–$\frac{1}{4}$ in. diam. Calyx-segments lanceolate, acute; stigma clavate. Mature capsule $\frac{3}{4}$–$1\frac{1}{4}$ in. long, strict, erect, glabrous; peduncle elongating but little. Seeds minutely papillose.

South Island: Nelson—Mount Percival and shingle-slopes near Lake Tennyson, *T. F. C.*; Mount Miromiro, *Petrie!* Canterbury and Westland—Shingle-slopes near the Otira Glacier and mountains above Arthur's Pass, *Cockayne*, *T. F. C.*; Sealy Range, Mount Cook district, *Petrie! T. F. C.* 3000–5500 ft. December–February.

Dr. Cockayne considers this to be allied to *E. confertifolium* and *E. tasmanicum*, or, in other words, to belong to Haussknecht's series *Microphyllae*. But the distinctly hard and woody stems, so very conspicuous in old plants, in my opinion will certainly place it in the *Dermatophylleae*, and in the close vicinity of *E. glabellum*. Its nearest ally is probably my *E. vernicosum*, which is at once separated by the very much larger flowers and glossy leaves.

30. **E. pycnostachyum** *Haussk. in Oestr. Bot. Zeitschr.* xxix (1879) 150.—Stems numerous from the top of a woody prostrate rhizome, 2–8 in. high, decumbent at the base and then erect or ascending, often reddish, simple or sparingly branched, usually with 2 or 4 pubescent lines. Leaves opposite or the upper ones alternate, densely crowded, ascending, $\frac{1}{2}$–$\frac{3}{4}$ in. long, narrow-oblong or oblong-obovate, obtuse or acute, narrowed into a short petiole, coarsely and remotely denticulate, glabrous or nearly so; lower ones often much reduced in size. Flowers crowded in the upper axils, hardly projecting beyond the leaves, large, white, $\frac{1}{3}$ in. diam. Calyx-lobes lanceolate, acute, much shorter than the petals. Stigma clavate. Capsules $\frac{1}{2}$–$\frac{3}{4}$ in. long, sessile or nearly so, stout, glabrous, rarely exceeding the leaves. Seeds papillose.—*Haussk. Monog. Epilob.* (1884) 306, t. 21, f. 8; *T. Kirk Students' Fl.* (1899) 176; *Cheesem. Man. N.Z. Fl.* (1906) 182.

North Island: Shingle-slopes on Te Atua Mahura, Ruahine Mountains, *B. C. Aston!* South Island: Nelson—Ben Nevis and Waingaro, *F. G. Gibbs!* Clarence and Waiau Valleys, *W. T. L. Travers!* Mount Captain, *T. Kirk!* Lake Tennyson, *T. F. C.* Canterbury—Mount Torlesse, *Petrie!* *T. F. C.*; Craigieburn Mountains, *Cockayne!* Arthur's Pass and Upper Waimakariri, *T. F. C.*; Whitcombe's Pass, *Haast!* Upper Rakaia, *Cockayne*; Mount Arrowsmith, *R. M. Laing* and *Cockayne*; Mount Peel, *H. H. Allan.* Otago—Shingle-slopes above Routeburn, *Poppelwell.* 2000–4500 ft. December–March.

Apparently confined to dry shingle-slopes. A well-marked plant, not easily confounded with any other. The large white flowers are almost hidden by the leaves, and the ripe capsules hardly protrude beyond them.

31. **E. melanocaulon** *Hook. Ic. Plant.* (1848) t. 813.—Rootstock stout, hard and woody. Stems numerous, arcuate at the base and then erect, slender, rigid, wiry, simple, black or purplish-black, obscurely tetragonous, glabrous except 2 or 4 faint pubescent lines on the angles. Leaves numerous, usually close-set, opposite or alternate, $\frac{1}{4}$–$\frac{2}{3}$ in. long, uniform, narrow linear-oblong, obtuse or apiculate, sessile or very shortly petioled, rigid and coriaceous, usually dark-red, glabrous, deeply and coarsely toothed or almost lobed. Flowers sessile in the upper axils, small, erect, $\frac{1}{5}$ in. diam., white or pink. Calyx-lobes ovate-lanceolate, acute, shorter than the petals. Stigma shortly clavate. Capsules $\frac{1}{2}$–1 in. long,

slender, purplish-black, glabrous; peduncles very short. Seeds papillose.—*Hook. f. Fl. Nov. Zel.* i (1853) 60; *Handb. N.Z. Fl.* (1864) 80; *Haussk. Monog. Epilob.* (1884) 307; *T. Kirk Students' Fl.* (1899) 177; *Cheesem. Man. N.Z. Fl.* (1906) 183; *Ill. N.Z. Fl.* i (1914) t. 54.

Var. **polyclonum.** — Stems much more slender, branched. Leaves distant, spreading, not so deeply toothed. Flowers rather smaller.—E. polyclonum *Haussk. Monog. Epilob.* (1884) 308, t. 20, f. 87A; *T. Kirk Students' Fl.* (1899) 177.

North Island: Ruahine Mountains and mountains near Lake Taupo, *Colenso!* Ruahine and Kaimanawa Mountains, Mount Tarawera, *B. C. Aston!* South Island: Abundant in shingly valleys in mountain districts throughout. Var. *polyclonum:* Subalpine districts in Canterbury and Otago, *W. T. L. Travers! Buchanan! T. Kirk! Petrie!* Altitudinal range 1000–3500 ft. December–March.

The typical form is one of the most easily recognized species of the genus, from the prominent characters of the numerous rigid simple purplish-black stems and small uniform deeply-toothed leaves.

32. **E. rostratum** *Cheesem. in Trans. N.Z. Inst.* xxviii (1896) 534.—Stems numerous from a hard woody rootstock, 2–6 in. high, decumbent at the base and then erect, simple or branched, terete, wiry, grey with a short uniform pubescence. Leaves opposite or the upper alternate, crowded, $\frac{1}{6}$–$\frac{1}{2}$ in. long, linear-oblong, obtuse or apiculate, coarsely toothed, rigid and coriaceous, glabrous or pubescent near the base, sessile or very shortly petiolate. Flowers rather numerous in the upper axils, small, erect, $\frac{1}{8}$ in. diam. Calyx-lobes ovate-lanceolate, pubescent, almost equalling the petals. Stigma narrow-clavate. Capsules $\frac{1}{2}$–$\frac{3}{4}$ in. long, sessile or very shortly peduncled, stout, curved, suddenly narrowed below the tip, grooved, finely and closely pubescent. Seeds minutely papillose.—*T. Kirk Students' Fl.* (1899) 177; *Cheesem. Man. N.Z. Fl.* (1906) 183.

Var. **pubens** *Petrie in Trans. N.Z. Inst.* xlv (1913) 265.—Much more depressed and spreading. Stems, leaves, and capsules more densely pubescent.

South Island: Canterbury—Shingly beds of streams, apparently not uncommon. Upper Waimakariri; Lake Tekapo and Lake Pukaki, *T. F. C.* Otago—Naseby, Black's, *Petrie!* 1000–3000 ft. December–February. Var. *pubens:* Dry ground, Upper Awatere Valley, *Cockayne!* Tapuaenuku, *B. C. Aston!*

This comes nearest to *E. melanocaulon*, from which it is distinguished by its smaller size, paler colour, uniform pubescence, and especially by the short curved capsules, which are abruptly narrowed towards the tip. Mr. Petrie's var. *pubens* appears to be distinct, but it is described from very scanty material.

33. **E. microphyllum** *A. Rich. Fl. Nouv. Zel.* (1832) 325, t. 36.—Stems very numerous from a hard and woody base, much branched below, 3–8 in. high, shortly decumbent at the base, erect strict and wiry above, dark purplish-black, bifariously pubescent. Leaves small, opposite or the upper ones alternate, $\frac{1}{8}$–$\frac{1}{5}$ in. long, oblong or ovate-oblong or ovate-orbicular, obtuse, sessile or very shortly petioled, obscurely denticulate or quite entire, glabrous, coriaceous. Flowers few towards the tips of the branches, small, white or pink, $\frac{1}{8}$ in. diam. Calyx-lobes ovate-lanceolate, acute, almost equalling the petals. Stigma clavate. Capsules $\frac{1}{2}$–$\frac{3}{4}$ in. long, strict, erect, purplish-black with 4 silvery pubescent lines on the angles; peduncles very short, hardly exceeding the leaves. Seeds smooth.—*A. Cunn. Precur.* (1839) n. 537; *Raoul Choix* (1846) 49; *Hook. f. Fl. Nov. Zel.* i (1853) 59; *Handb. N.Z. Fl.* (1864) 79; *Haussk. Monog. Epilob.* (1884) 308, t. 18, f. 79; *T. Kirk Students' Fl.* (1899) 178; *Cheesem. Man. N.Z. Fl.* (1906) 184.

Var. **prostrata** *Petrie in Trans. N.Z. Inst.* xliv (1912) 180.—Stems prostrate, diffusely branched. Peduncles longer. Otherwise as in the type.

North Island: Near Waiapu (East Cape district), *Petrie!* Lake Waikaremoana, *Elsdon Best!* Tarawera Mountain and the Kaimanawa Ranges, *B. C. Aston!* east coast and Cape Palliser, *Colenso!* Orongorongo River, *T. Kirk.* South Island: Shingly river-beds from Nelson and Marlborough to Foveaux Strait. Var. *prostrata:* Broken River, Opihi River, near Naseby, *Petrie!* Mount Somers, *B. C. Aston.* Sea-level to 3500 ft. *Papa-koura.* December–March.

A well-known plant, easily recognized by the strict and wiry habit, purplish-black stems, small uniform leaves, small flowers, and dark-purplish capsules with silvery-pubescent angles. Mr. Petrie's var. *prostrata* is a very distinct little plant.

34. **E. Krulleanum** *Haussk. Monog. Epilob.* (1884) 305, t. 23, f. 95.—Stems numerous from a hard and woody base, 2–6 in. high, decumbent below, erect above, strict and wiry, densely leafy, bifariously pubescent. Leaves opposite or the uppermost alternate, $\frac{1}{3}$–$\frac{1}{2}$ in. long, ovate or oblong-ovate, obtuse, shortly petioled, coricaceous, often purplish, entire or very obscurely denticulate. Flowers few in the upper axils, small, erect, $\frac{1}{5}$ in. diam. Calyx-lobes ovate-lanceolate, acute, almost equalling the petals. Stigma clavate. Capsule strict, erect, glabrous, $\frac{3}{4}$–$1\frac{1}{4}$ in. long; peduncles usually shorter than the leaves. Seeds papillose.—*T. Kirk Students' Fl.* (1899) 175; *Cheesem. Man. N.Z. Fl.* (1906) 184.

South Island: Nelson—Hanmer Plains, *T. Kirk!* Canterbury—*Krull, Haast.* Otago—Mount Earnslaw and the Humboldt Mountains, *Cockayne!* 1500–3500 ft. December–February.

A very imperfectly understood species, of which much more complete specimens are required before its exact position can be determined.

35. **E. glabellum** *Forst. f. Prodr.* (1786) n. 160.—Stems 6–14 in. high, usually numerous from a hard and woody base, decumbent below, strict and erect above, terete or obscurely tetragonous, often red or purple, glabrous with the exception of 2 or 4 pubescent lines decurrent from the petioles, simple or branched below, remotely or densely leafy. Leaves opposite or the upper alternate, $\frac{1}{3}$–$\frac{3}{4}$ in. long, ovate or ovate-oblong to narrow-oblong, obtuse, shortly petioled or almost sessile, perfectly glabrous, usually red or purple, often shining, from almost membranous to coriaceous, remotely sinuate-denticulate. Flowers in the upper axils, few or many, erect, white or pink, $\frac{1}{5}$–$\frac{1}{4}$ in. diam. Calyx-lobes ovate-lanceolate, acute, glabrous, shorter than the petals. Stigma rounded-clavate. Capsules 1–2 in. long, slender, erect, glabrous; peduncles short, seldom much exceeding the leaves. Seeds papillose.—*Hook. f. Fl. Nov. Zel.* i (1853) 59; *Handb. N.Z. Fl.* (1864) 79; *Haussk. Monog. Epilob.* (1884) 304; *T. Kirk Students' Fl.* (1899) 174; *Cheesem. Man. N.Z. Fl.* (1906) 185; *Ill. N.Z. Fl.* i (1914) t. 55. E. erubescens *Haussk. l.c.* 306, t. 23, f. 98; *T. Kirk l.c.* 175.

North Island: Rare and local north of the East Cape, common in mountain districts from thence southwards. South Island: Abundant throughout. Sea-level to over 5000 ft. December–February.

One of the most variable and puzzling plants in New Zealand; excessively plentiful in hilly and mountainous districts in the South Island. I have reunited Professor Haussknecht's *E. erubescens* with it, finding it quite impossible to lay down a strict line of demacration between the two plants. The true *E. glabellum* is less rigid, with more membranous distantly placed leaves, and the capsules are longer and shortly stalked. *E. erubescens* has numerous rigid simple stems, the leaves are crowded and erect, the flowers more numerous, and the capsules shorter and almost sessile. But

intermediate states are plentiful, and many of them might with equal propriety be placed under either head. Forster's original description of his *E. glabellum* is very short and vague. It reads as follows: "foliis oblongis dentatis obtusis: imis oppositis, caule teretiusculo erecto," and might be applied to half a dozen species at least. As there has always been some uncertainty as to whether Forster's plant has been rightly identified, and as his original specimens are all outside the Dominion, and beyond my search, I applied to Dr. Rendle, of the British Museum, for assistance in the matter. He has been kind enough to forward me two photographs of Forster's type, which satisfactorily prove its identity with the plant described above.

36. **E. Matthewsii** *Petrie in Trans. N.Z. Inst.* liii (1921) 369.—"Stems few or several from a hard base, rarely branched and then only from the base, erect or at first decumbent, rather stout, purplish, slightly bifariously pubescent, otherwise glabrous, leafy throughout, lowermost leaves larger and broader. Leaves in opposite subconnate pairs, elliptic, $1\frac{3}{4}$–2 in. long, $\frac{1}{3}$ in. broad, subacute, reddish-green, rather thin, narrowed into short broad petioles, entire or slightly repand, glabrous; veins prominent on both surfaces and running out obliquely from the midrib. Flowers as many as 7 in the axils of the higher leaves, crowded near the tops of the stems; peduncles as long as their subtending leaves, reddish, glabrous. Calyx-lobes lanceolate, acute, nearly as long as the pink corolla. Capsule $\frac{3}{4}$–1 in. long, rather stout, glabrous, reddish; seeds papillose."—E. arcuatum *Petrie l.c.* xlv (1913) 266 (*not of Levielle*). T. 72 · 26.

South Island: Otago—Clinton Valley, *Cockayne! Petrie!* Mackinnon's Pass, *H. J. Matthews.* 3000–5000 ft. January–February.

I have seen only very few specimens of this, and have consequently reproduced Mr. Petrie's description. It appears to differ from *E. glabellum* in the stouter habit and broader leaves.

37. **E. novae-zealandiae** *Haussk. Monog. Epilob.* (1884) 305, t. 20, f. 86.—Stems 3–9 in. high, decumbent or prostrate at the base, erect or ascending above, branched, usually pale-green, bifariously pubescent. Leaves opposite or the uppermost alternate, $\frac{1}{2}$–1 in. long, lanceolate or linear-oblong to oblong, obtuse or subacute, sessile or very shortly petiolate, rather thin, light-green, glabrous, obscurely and remotely denticulate. Flowers in the axils of the upper leaves, small, white, $\frac{1}{6}$–$\frac{1}{4}$ in. diam. Calyx-lobes ovate-lanceolate, glabrous, shorter than the petals. Stigma shortly clavate. Capsules $\frac{3}{4}$–$1\frac{1}{2}$ in. long, slender, glabrous; peduncles usually longer than the leaves when the fruit is mature. Seeds papillose.—*T. Kirk Students' Fl.* (1899) 175; *Cheesem. Man. N.Z. Fl.* (1906) 185. E. elegans *Petrie in Trans. N.Z. Inst.* xxix (1897) 425.

North Island: Bay of Islands, *Colenso*, No. 103! *Wilkes* (Haussknecht). South Island: Apparently not uncommon. Stewart Island: *Cockayne.*

This requires further investigation with much more complete material than I possess. Haussknecht states that it is very similar to *E. glabellum*, but can be at once distinguished by the paler colour of the stems and leaves, by the numerous opposite branches, which are thickly placed on the stem from the base upwards, by the sessile or not distinctly petiolate leaves, and by the longer stalks to the capsules. Its position with regard to Petrie's *E. elegans* also demands fuller inquiry.

2. **FUCHSIA** Linn.

Shrubs or small trees. Leaves alternate or opposite or whorled. Flowers axillary, solitary or clustered, rarely in racemes or panicles, usually pendulous, often handsome. Calyx-tube ovoid, produced above the ovary

into a tubular or companulate 4-lobed limb. Petals 4, often small, rarely wanting, convolute, spreading or reflexed. Stamens 8; filaments filiform; anthers linear or oblong. Ovary 4-celled; style slender, elongated; stigma capitate, entire or 4-lobed; ovules numerous, attached to the inner angle of the cells. Berry ovoid or oblong, fleshy, 4-celled, many-seeded.

A beautiful and well-known genus of about 65 species, all of which, with the exception of the 3 following, are natives of America, from Mexico to Fuegia.

* Flowers pendulous. Petals present, small.

Shrub or tree 10–40 ft. high. Leaves lanceolate or ovate-lanceolate	1. *F. excorticata.*
Small shrub with long straggling branches. Leaves ovate or orbicular-ovate	2. *F. Colensoi.*

** Flowers erect. Petals wanting.

Stems very slender, trailing. Leaves small, orbicular-ovate ..	3. *F. procumbens.*

1. **F. excorticata** *Linn. f. Suppl.* (1781) 217.—A shrub or small tree 40 ft. high; trunk usually 6–18 in. diam., but sometimes reaching 2–3 ft.; bark thin, loose and papery; branches brittle. Leaves deciduous, alternate, 2–5 in. long including the slender petiole, ovate-lanceolate or lanceolate, acuminate, entire or obscurely and remotely toothed, thin and membranous, green above, pale and silvery beneath. Flowers $\frac{3}{4}$–$1\frac{1}{4}$ in. long, axillary, solitary, pendulous; peduncles long, slender. Calyx-tube inflated at the base, then suddenly contracted and again expanded into a funnel-shaped tube; lobes 4, acuminate, spreading. Petals 4, small. Stamens and style very variable in length. Berry oblong, purplish-black, juicy, $\frac{1}{2}$ in. long.—*Lindl. in Bot. Reg.* (1824) t. 857; *A. Cunn. Precur.* (1839) n. 533; *Raoul Choix* (1846) 49; *Hook. f. Fl. Nov. Zel.* i (1853) 56; *Handb. N.Z. Fl.* (1864) 75; *T. Kirk Forest Fl.* (1889) t. 36, 36A; *Students' Fl.* (1899) 180; *Cheesem. Man. N.Z. Fl.* (1906) 186. Skinnera exorticata *Forst. Char. Gen.* (1776) 58; *Forst. f. Prodr.* (1786) n. 163; *A. Rich. Fl. Nouv. Zel.* (1832) 331.

North and South Islands, Stewart Island: Abundant from the North Cape to Stewart Island. Auckland Islands: Laurie Harbour, *B. C. Aston!* Sea-level to 3500 ft. *Native fuchsia; Kotukutuku;* of the fruit *Konini.* August–December.

The flowers are trimorphic, there being a long-styled form in which the stamens have short filaments and often abortive anthers, and mid-styled and short-styled forms in which the stamens have longer filaments and perfect anthers, the last two apparently graduating into one another. For a detailed account see a paper by Mr. Kirk in the "Transactions of the New Zealand Institute," vol. xxv (1893), p. 261.

2. **F. Colensoi** *Hook. f. Handb. N.Z. Fl.* (1867) 728.—A small shrub with long straggling branches, sometimes producing slender flexuous unbranched shoots several feet in length. Leaves alternate, very variable in size, $\frac{1}{2}$–2 in. long including the petiole, ovate or orbicular-ovate, rounded or cordate at the base, thin and membranous, entire or obscurely toothed; petioles often longer than the blade. Flowers much as in *F. excorticata*, but shorter and proportionately broader, and petals smaller.—*T. Kirk Students' Fl.* (1899) 181; *Cheesem. Man. N.Z. Fl.* (1906) 187.

North and South Islands, Stewart Island: From the Northern Wairoa River southwards, but often local. Sea-level to 1500 ft. October–February.

This is either a very variable plant, or two very distinct forms are included in the present conception of the species.

3. **F. procumbens** *R. Cunn. ex A. Cunn. Precur.* (1839) n. 534.—Stems very slender, much branched, prostrate and trailing, often several feet long. Leaves alternate; blade $\frac{1}{4}$–$\frac{3}{4}$ in. long, rounded-ovate or almost orbicular, cordate at the base, obscurely sinuate-toothed, membranous; petioles very slender, longer than the blade. Flowers axillary, solitary, erect, $\frac{1}{2}$–$\frac{3}{4}$ in. long; peduncles short, $\frac{1}{4}$–$\frac{1}{2}$ in. Calyx-tube cylindric, without raised ridges, pale-orange; lobes sharply reflexed, purple at the tips, green at the base. Petals wanting. Stamens erect, always exserted; filaments slender. Style longer or shorter than the stamens, or equal to them. Berry large, oblong or obovoid, $\frac{3}{4}$ in. long, bright-red, glaucous.—*Hook. Ic. Plant.* (1842) t. 421; *Raoul Choix* (1846) 49; *Hook. f. Fl. Nov. Zel.* i (1853) 57; *Handb. N.Z. Fl.* (1864) 76, 728; *Bot. Mag.* (1874) t. 6139; *T. Kirk Students' Fl.* (1899) 181; *Cheesem. Man. N.Z. Fl.* (1906) 187; *Ill. N.Z. Fl.* i (1914) t. 56.

new species.

Fuchsia perscandens Ckn. & Allan.

North and South Is. .. forests near Fielding - Sounds - Nelson Bot. Dist.; North Western, and Eastern Botanical Dists.

T.N.Z.I. vol. 57, p. 53. Ckn. & Allan.

Flora .. under plate 56.

Family LXXV. **HALORAGIDACEAE.**

Herbs, often aquatic, rarely undershrubs. Leaves opposite, alternate, or whorled, when submerged often pectinately pinnatifid; stipules wanting. Flowers hermaphrodite or unisexual, always small and often incomplete. Calyx-tube adnate to the ovary; lobes 2, 4, or wanting. Petals 2, 4, or wanting, valvate or slightly imbricate. Stamens 2 or 4–8, rarely 1 or 3, large, epigynous; filaments short, filiform; anthers 2-celled. Ovary inferior, compressed, angled or ribbed, rarely 2–4-winged, 2- or 4-celled, rarely 3-celled; styles 1–4, distinct; stigmas papillose or plumose; ovules as many as the styles, pendulous, anatropous. Fruit small, dry or succulent, 1–4-celled, indehiscent or separating into 1–4 indehiscent carpels. Seeds solitary in the cells, pendulous; albumen fleshy, usually copious; embryo cylindrical, axile.

A small family of mostly inconspicuous plants, many of them water-weeds. Genera 8; species about 90. Of the 3 New Zealand genera, *Haloragis* is mainly Australian, but extends northwards to China and Japan, and westwards to Juan Fernandez and Chile; *Myriophyllum* is practically cosmopolitan; while *Gunnera* is confined to the South Temperate Zone.

Terrestrial. Calyx 4-lobed. Stamens 4–8. Petals valvate. Fruit nut-like, undivided	1. Haloragis.
Aquatic. Calyx-lobes obscure. Stamens 4–8. Petals imbricate. Fruit separating into 2–4 nut-like carpels	2. Myriophyllum.
Subaquatic or terrestrial. Stamens usually 2. Fruit a 1-seeded drupe	3. Gunnera.

into a tubular or companulate 4-lobed limb. Petals 4, often small, rarely wanting, convolute, spreading or reflexed. Stamens 8; filaments filiform; anthers linear or oblong. Ovary 4-celled; style slender, elongated; stigma capitate, entire or 4-lobed; ovules numerous, attached to the inner angle of the cells. Berry ovoid or oblong, fleshy, 4-celled, many-seeded.

A beautiful and well-known genus of about 65 species, all of which, with the exception of the 3 following, are natives of America, from Mexico to Fuegia.

* Flowers pendulous. Petals present, small.

Shrub or tree 10–40 ft. high. Leaves lanceolate or ovate-lanceolate	1. *F. excorticata.*
Small shrub with long straggling branches. Leaves ovate or orbicular-ovate	2. *F. Colensoi.*

** Flowers erect. Petals wanting.

Stems very slender, trailing. Leaves small, orbicular-ovate	3. [illegible]

[illegible] *Zel.* 1 (1853) 56; *Handb.* [illegible] (1864) 75; *T. Kirk Forest Fl.* (1889) t. 36, 36A; *Students' Fl.* (1899) 180; *Cheesem. Man. N.Z. Fl.* (1906) 186. Skinnera exorticata *Forst. Char. Gen.* (1776) 58; *Forst. f. Prodr.* (1786) n. 163; *A. Rich. Fl. Nouv. Zel.* (1832) 331.

North and South Islands, Stewart Island: Abundant from the North Cape to Stewart Island. Auckland Islands: Laurie Harbour, *B. C. Aston!* Sea-level to 3500 ft. *Native fuchsia; Kotukutuku;* of the fruit *Konini.* August–December.

The flowers are trimorphic, there being a long-styled form in which the stamens have short filaments and often abortive anthers, and mid-styled and short-styled forms in which the stamens have longer filaments and perfect anthers, the last two apparently graduating into one another. For a detailed account see a paper by Mr. Kirk in the "Transactions of the New Zealand Institute," vol. xxv (1893), p. 261.

2. **F. Colensoi** *Hook. f. Handb. N.Z. Fl.* (1867) 728.—A small shrub with long straggling branches, sometimes producing slender flexuous unbranched shoots several feet in length. Leaves alternate, very variable in size, $\frac{1}{2}$–2 in. long including the petiole, ovate or orbicular-ovate, rounded or cordate at the base, thin and membranous, entire or obscurely toothed; petioles often longer than the blade. Flowers much as in *F. excorticata*, but shorter and proportionately broader, and petals smaller.—*T. Kirk Students' Fl.* (1899) 181; *Cheesem. Man. N.Z. Fl.* (1906) 187.

North and South Islands, Stewart Island: From the Northern Wairoa River southwards, but often local. Sea-level to 1500 ft. October–February.

This is either a very variable plant, or two very distinct forms are included in the present conception of the species.

3. **F. procumbens** *R. Cunn. ex A. Cunn. Precur.* (1839) n. 534.—Stems very slender, much branched, prostrate and trailing, often several feet long. Leaves alternate; blade $\frac{1}{4}$–$\frac{3}{4}$ in. long, rounded-ovate or almost orbicular, cordate at the base, obscurely sinuate-toothed, membranous; petioles very slender, longer than the blade. Flowers axillary, solitary, erect, $\frac{1}{2}$–$\frac{3}{4}$ in. long; peduncles short, $\frac{1}{4}$–$\frac{1}{2}$ in. Calyx-tube cylindric, without raised ridges, pale-orange; lobes sharply reflexed, purple at the tips, green at the base. Petals wanting. Stamens erect, always exserted; filaments slender. Style longer or shorter than the stamens, or equal to them. Berry large, oblong or obovoid, $\frac{3}{4}$ in. long, bright-red, glaucous.—*Hook. Ic. Plant.* (1842) t. 421; *Raoul Choix* (1846) 49; *Hook. f. Fl. Nov. Zel.* i (1853) 57; *Handb. N.Z. Fl.* (1864) 76, 728; *Bot. Mag.* (1874) t. 6139; *T. Kirk Students' Fl.* (1899) 181; *Cheesem. Man. N.Z. Fl.* (1906) 187; *Ill. N.Z. Fl.* i (1914) t. 56.

North Island: Sandy and rocky places near the sea, rare and local. North Cape district, near Cape Maria van Diemen, coast between the North Cape and Parengarenga Harbour, coast near Houhora, *Adams* and *T. F. C.*; Ahipara and Waihi, *R. H. Matthews* and *T. F. C.*; Kawerua (Hokianga), *Cockayne*; Matauri Bay, *R. Cunningham*; Whangaruru Harbour, *T. Kirk*; Whangarei Heads and coast near Ngunguru, *T. F. C.*; Tryphena Harbour and Mine Bay (Great Barrier Island), *T. Kirk! A. J. Osborne! L. T. Griffin!* Cabbage Bay, *Adams!* and further North L.M.C.

A beautiful and graceful little plant, remarkable for being the only species known with erect flowers. As in *F. excorticata*, the flowers are trimorphic. In the long-styled form the flowers are smaller and narrower, much less brightly coloured, the style is exserted far beyond the anthers, the stigma is very large, and the anthers rather smaller. The mid-styled and short-styled forms appear to vary into one another: in the first the style usually equals the anthers, in the second it is shorter and included within the calyx-tube. The stamens are of equal length in all the forms. For additional remarks respecting the species, see the account given in the "Illustrations of the New Zealand Flora" under plate 56.

Family LXXV. HALORAGIDACEAE.

Herbs, often aquatic, rarely undershrubs. Leaves opposite, alternate, or whorled, when submerged often pectinately pinnatifid; stipules wanting. Flowers hermaphrodite or unisexual, always small and often incomplete. Calyx-tube adnate to the ovary; lobes 2, 4, or wanting. Petals 2, 4, or wanting, valvate or slightly imbricate. Stamens 2 or 4–8, rarely 1 or 3, large, epigynous; filaments short, filiform; anthers 2-celled. Ovary inferior, compressed, angled or ribbed, rarely 2–4-winged, 2- or 4-celled, rarely 3-celled; styles 1–4, distinct; stigmas papillose or plumose; ovules as many as the styles, pendulous, anatropous. Fruit small, dry or succulent, 1–4-celled, indehiscent or separating into 1–4 indehiscent carpels. Seeds solitary in the cells, pendulous; albumen fleshy, usually copious; embryo cylindrical, axile.

A small family of mostly inconspicuous plants, many of them water-weeds. Genera 8; species about 90. Of the 3 New Zealand genera, *Haloragis* is mainly Australian, but extends northwards to China and Japan, and westwards to Juan Fernandez and Chile; *Myriophyllum* is practically cosmopolitan; while *Gunnera* is confined to the South Temperate Zone.

Terrestrial. Calyx 4-lobed. Stamens 4–8. Petals valvate. Fruit nut-like, undivided	1. Haloragis.
Aquatic. Calyx-lobes obscure. Stamens 4–8. Petals imbricate. Fruit separating into 2–4 nut-like carpels	2. Myriophyllum.
Subaquatic or terrestrial. Stamens usually 2. Fruit a 1-seeded drupe	3. Gunnera.

1. HALORAGIS Forst. 1776.

Erect or procumbent branching wiry herbs, sometimes almost woody at the base. Leaves opposite or alternate, entire or toothed or lobed. Flowers unisexual or hermaphrodite, minute, axillary, solitary or clustered, often spicate or racemose. Calyx-tube 4–8-angled or winged; lobes 4, erect, persistent. Petals 4, cucullate, acute, coriaceous, often wanting in the female flowers. Stamens 4–8, filaments usually short. Ovary 2–4-celled; ovules solitary in each cell, pendulous; styles short, stigmas usually plumose in the female flowers. Fruit a small dry 2–4-celled 2–4-seeded nut, sometimes 1-celled and 1-seeded by abortion; the adnate calyx-tube either smooth, ribbed, or muricate.

About 60 species are known, mostly from Australia; but a few are also known in New Caledonia, eastern Asia, extending as far north as Japan and temperate South America (Juan Fernandez). With the exception of 2, the New Zealand species appears to be endemic.

Tall, erect, 1–3 ft. high. Leaves large, lanceolate, 1–3 in. Flowers crowded, drooping	1. *H. erecta.*
Erect, 6–12 in. Leaves broadly ovate, cartilaginous, $\frac{1}{2}$–$\frac{3}{4}$ in. Flowers crowded, drooping	2. *H. cartilaginea.*
Suberect or diffuse, 6–15 in. Leaves $\frac{1}{4}$–$\frac{1}{3}$ in., the floral alternate. Fruit ovoid, 4–8-ribbed, the interspaces between the ribs muricate	3. *H. incana.*
Procumbent or prostrate, 4–12 in. Leaves small, ovate, $\frac{1}{4}$–$\frac{1}{2}$ in., the floral alternate. Fruit ovoid, the interspaces between the ribs rugose	4. *H. procumbens.*
Rhizome creeping, stems ascending or erect. Leaves small, ovate, $\frac{1}{5}$–$\frac{1}{2}$ in., the floral usually opposite. Fruit 8-ribbed, the interspaces between the ribs smooth and shining	5. *H. depressa.*
Rhizome creeping, stems often matted. Leaves small, ovate to lanceolate, $\frac{1}{8}$–$\frac{1}{3}$ in., the floral usually opposite. Fruit 4–8-ribbed, interspaces smooth and shining	6. *H. uniflora.*
Stems creeping and rooting, ascending, glabrous. Flowers in long erect spikes. Floral leaves reduced to minute alternate bracts. Fruit 8-ribbed, smooth and shining	7. *H. micrantha.*

1. **H. erecta** *Schindler in Pflanzenr.* Heft 23 (1905) 49.—A coarse erect branching herb 1–3 ft. high; stems sharply 4-angled, minutely scabrid. Leaves opposite, petiolate, variable in size, $\frac{1}{2}$–3 in. long, ovate-lanceolate to oblong-lanceolate, rarely elliptic, coarsely and sharply serrate, acute or acuminate. Flowers minute, solitary or clustered in leafy racemes terminating the branches; pedicels short, curved, drooping. Calyx-tube 4-angled; lobes small, broad. Petals more than twice as long as the calyx-lobes. Stamens 8; anthers broadly linear. Fruit rather small, $\frac{1}{10}$ in. long, ovoid, with 4 ribs more or less dilated into wings, interspaces smooth or rugose. Seeds 4.—H. alata *Jacq. Ic. Plant. Rar.* i (1781) 7, t. 69; *Forst. f. Prodr.* (1786) n. 180; *Hook. f. Fl. Nov. Zel.* i (1853) 65; *Handb. N.Z. Fl.* (1864) 65; *Benth. Fl. Austral.* ii (1864) 479; *T. Kirk Students' Fl.* (1899) 148; *Cheesem. Man. N.Z. Fl.* (1906) 148. Cercodia erecta *Murr. in Comm. Gotting.* iii (1780) 3, t. 1. C. alternifolia *A. Cunn. Precur.* (1839) n. 527.

Kermadec Islands, North and South Islands, Chatham Islands, Stewart Island: Abundant, especially in lowland districts. Sea-level to 2500 ft. *Toatoa.* November–January. Also in Chile and on the Island of Juan Fernandez. The Australian plant formerly referred to the species is now considered to be distinct (*H. exalata* F. Muell.).

2. **H. cartilaginea** *Cheesem. in Trans. N.Z. Inst.* xxix (1897) 390.—Stems numerous, stout, erect, 6–12 in. high, sharply 4-angled, usually branched above, rough with minute asperities but otherwise glabrous. Leaves opposite, often decussate, shortly petiolate, broadly ovate or ovate-oblong, ½–¾ in. long, acute, coarsely and deeply crenate-dentate, very coriaceous, cartilaginous, especially at the margins, shining but scabrid, margins [illegible] terminating the stem and

HALORRHAGIS Subsect. Cercodia
(after Skottsberg: Phan. of Juan Fernandez, 1921: 153).

1. Whole plant perfectly smooth . . Colensoi
   Whole plant scabrid 2
2. Densely scabro-velutinous. Leaves thick, broadly ovate . . . . . cartilaginea
   Coarsely scabrid, leaves thin . . . erecta

H. Colensoi Skottsb. (in "leaves ovate or broad lanceolate. Fruit small, c. 3 mm. long. P.152. "Murray described a scabrid plant with alate fruits (see fig. 17 a-g) In Herb. Kew I saw specimens of this kind collected by Forster, Cunningham, Buchanan, J.D. Hooker, Cheeseman a.o. Forster's specimens are less scabrous than the rest. But under the same name was a smooth form collected by Colenso, with small, barely alate fruits, recalling my H. masatierrana in habitus, but differing in the shape and size of the fruit (see fig. 17 h) I have called this H. Colensoi".

A. Cunn. Precur. (1839) n. 528.

North Island: From the North Cape southwards to the Bay of Islands and Whangarei, not uncommon. Sea-level to 1000 ft. November–January. Apparently endemic.

Schindler has pointed out that this plant is distinct from the Australian *H. tetragyna*, with which it was united by Hooker. On comparing it with Australian specimens, I find that it differs in the smaller size, shorter and less pointed leaves with fewer serratures, and in the larger and narrower fruit. Schindler proposes to adopt Buchanan's name of *H. aggregata*. But Buchanan's plant, of which I hold some of the type specimens, is referable to *H. depressa*, of which it has the habit, foliage, and distinctive fruit. And, in addition, there is an older name of *H. incana* Walp., which I have consequently adopted.

4. **H. procumbens** *Cheesem. in Trans. N.Z. Inst.* xlii (1910) 202.—Stems slender, much branched, procumbent or even prostrate, 4–12 in. long; branches 4-angled, rough with minute asperities, and sparingly clothed with appressed hairs. Leaves opposite, shortly petioled, oblong or oblong-ovate, acute or subacute, rigid and coriaceous, ¼–½ in. long, but

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Erect or procumbent branching wiry herbs, sometimes almost woody at the base. Leaves opposite or alternate, entire or toothed or lobed. Flowers unisexual or hermaphrodite, minute, axillary, solitary or clustered, often spicate or racemose. Calyx-tube 4–8-angled or winged; lobes 4, erect, persistent. Petals 4, cucullate, acute, coriaceous, often [illegible] the female [illegible] celled; c plumose nut, som either sm

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Tall, erect, l crowded,

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Procumbent the floral ribs rugos

Rhizome cre $\frac{1}{5}$–$\frac{1}{2}$ in., th spaces bet

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Stems creepi long erect bracts. Fr

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Kermadec Islands, North and South Islands, Chatham Islands, Stewart Island: Abundant, especially in lowland districts. Sea-level to 2500 ft. *Toatoa.* November–January. Also in Chile and on the Island of Juan Fernandez. The Australian plant formerly referred to the species is now considered to be distinct (*H. exalata* F. Muell.).

2. **H. cartilaginea** *Cheesem. in Trans. N.Z. Inst.* xxix (1897) 390.—Stems numerous, stout, erect, 6–12 in. high, sharply 4-angled, usually branched above, rough with minute asperities but otherwise glabrous. Leaves opposite, often decussate, shortly petiolate, broadly ovate or ovate-oblong, $\frac{1}{2}$–$\frac{3}{4}$ in. long, acute, coarsely and deeply crenate-dentate, very coriaceous, cartilaginous, especially at the margins, shining but scabrid, margins thick. Flowers small, in many-flowered racemes terminating the stem and branches, clustered, drooping, shortly pedicelled, furnished with 2 minute bracteoles. Calyx-tube obversely pyramidal; lobes 4, ovate, acuminate. Petals 4, not unguiculate, rounded at the apex, rather longer than the calyx-lobes, often wanting in the female flowers. Stamens 8; styles and ovules 4. Fruit broad at the base, where it is furnished with 4 short wings, narrowed upwards, conspicuously rugose between the wings. Seeds 4.—*Schindler in Pflanzenr.* Heft 23 (1905) 51. H. alata *var.* cartilaginea *Cheesem. Man. N.Z. Fl.* (1906) 148.

North Island: Cliffs near the North Cape, not uncommon on a limited stretch between Tom Bowline's Bay and the Cape. January.

Close to the preceding species, but distinguished by the much smaller size and stouter habit, shorter and broader leaves, which are highly cartilaginous, and by the much more rugose fruit.

3. **H. incana** *Walp. Rep.* ii (1843) 99.—A rigid and wiry erect or diffusely branched herb 6–15 in. high, usually scabrid with white appressed hairs; stems decumbent at the base, ascending above, 4-angled. Leaves opposite, shortly petiolate, $\frac{1}{4}$–$\frac{3}{4}$ in. long, elliptical-ovate or oblong to ovate-lanceolate, acute, coriaceous, scabrid with appressed hairs, sharply serrate; teeth many; floral leaves or bracts often alternate. Flowers minute, solitary in the axils of the floral leaves, forming slender leafy terminal spikes, which are sometimes branched and paniculate. Calyx-tube elliptic, longer than broad, 8-ribbed, interspaces between the ribs usually rugose. Stamens 8. Styles 4; stigmas plumose. Fruit $\frac{1}{10}$ in. long, ovoid, 4–8-costate, transversely rugose.—H. tetragyna *Hook. f. Fl. Nov. Zel.* i (1853) 62; *Handb. N.Z. Fl.* (1864) 65 (*but not of Fl. Tasm.* i (1860) 120, *nor of Benth. Fl. Austral.* ii (1864) 484). H. aggregata *Schindler in Pflanzenr.* Heft 23 (1905) 34 (*not of Buch. in Trans. N.Z. Inst.* iv (1872) 224, t. 13). H. tetragyna *var.* incana *T. Kirk Students' Fl.* (1899) 148. Cercodia incana *A. Cunn. Precur.* (1839) n. 528.

North Island: From the North Cape southwards to the Bay of Islands and Whangarei, not uncommon. Sea-level to 1000 ft. November–January. Apparently endemic.

Schindler has pointed out that this plant is distinct from the Australian *H. tetragyna*, with which it was united by Hooker. On comparing it with Australian specimens, I find that it differs in the smaller size, shorter and less pointed leaves with fewer serratures, and in the larger and narrower fruit. Schindler proposes to adopt Buchanan's name of *H. aggregata*. But Buchanan's plant, of which I hold some of the type specimens, is referable to *H. depressa*, of which it has the habit, foliage, and distinctive fruit. And, in addition, there is an older name of *H. incana* Walp., which I have consequently adopted.

4. **H. procumbens** *Cheesem. in Trans. N.Z. Inst.* xlii (1910) 202.—Stems slender, much branched, procumbent or even prostrate, 4–12 in. long; branches 4-angled, rough with minute asperities, and sparingly clothed with appressed hairs. Leaves opposite, shortly petioled, oblong or oblong-ovate, acute or subacute, rigid and coriaceous, $\frac{1}{4}$–$\frac{1}{2}$ in. long, but

much reduced in size towards the tips of the branches, where they usually become alternate, generally sparsely clothed with short appressed hairs, sharply serrate; serratures few. Flowers minute, solitary and sessile in the axils of the upper leaves or floral bracts, forming slender leafy spikes. Calyx-tube broadly oblong, longer than broad; 8-costate, tetragonous; calyx-lobes 4, ovate-lanceolate. Stamens 8. Styles 4; stigmas plumose. Fruit ovoid, 4-8-ribbed; more or less rugose or nodular.—H. tetragyna *var.* diffusa *Hook. f. Fl. Nov. Zel.* i (1853) 62; *Handb. N.Z. Fl.* (1864) 65; *T. Kirk Students' Fl.* (1899) 148; *Cheesem. Man. N.Z. Fl.* (1906) 149. H. aggregata *var.* diffusa *Schindler in Pflanzenr.* Heft 23 (1905) 34 (*but not* H. aggregata *Buch. in Trans. N.Z. Inst.* iv (1872) 224, t. 13).

North and South Islands, Stewart Island: Not uncommon from the Three Kings Islands and the North Cape to Stewart Island. Sea-level to 2000 ft. November–February.

Hooker regarded this as a variety of the preceding species, from which it differs in the slender and much-branched procumbent or prostrate stems; and in the smaller, broader, and more obtuse leaves, with fewer serratures. I think there can be no doubt as to its specific distinctness.

5. **H. depressa** (A. Cunn.) *Walp. Rep.* ii (1843) 99.—Stems creeping and rooting at the base, ascending and erect above, much branched, slender, wiry, pilose with appressed whitish hairs. Leaves usually all opposite, more rarely alternate towards the tips of the branches, the lower pairs remote, the upper closer together, sessile or shortly petioled, $\frac{1}{5}$–$\frac{1}{2}$ in. long, ovate or broadly ovate to oblong or oblong-lanceolate, acute or subacute, more or less pilose with appressed hairs, thinly coriaceous, crenate-serrate or incised; teeth 2–4 on each side. Flowers at the tips of the branches, solitary, axillary, sessile, often close together through the shortening of the internodes between the upper pairs of leaves, about $\frac{1}{10}$ in. long. Calyx-tube tetragonous, 8-ribbed, broadly ovoid, smooth and polished; lobes 4, triangular. Stamens 8. Styles 4, large, plumose, exserted between the calyx-lobes. Fruit shining, tetragonous, 8-ribbed, smooth and polished between the ribs or very minutely rugulose.—*Hook. f. Fl. Nov. Zel.* i (1853) 63; *Handb. N.Z. Fl.* (1864) 65; *T. Kirk Students' Fl.* (1899) 148; *Cheesem. Man. N.Z. Fl.* (1906) 149. H. bibracteolata *Col. in Trans. N.Z. Inst.* xxii (1890) 462. H. uniflora *var.* bibracteolata *Schindler in Pflanzenr.* Heft 23 (1905) 43. Goniocarpus depressus *A. Cunn. Precur.* (1839) n. 541.

Var. **aggregata**.—*T. Kirk Students' Fl.* (1899) 149.—Flowers clustered at the tips of the branches, forming small heads.—H. aggregata *Buch. in Trans. N.Z. Inst.* iv (1872) 224, t. 13 (*but not* H. aggregata *Schindler in Pflanzenr.* Heft 23 (1905) 34).

Var. **spicata** *Schindler* (under *H. uniflora*) *in Pflanzenr.* Heft 23 (1905) 43.—Taller, much elongated. Leaves few, broadly ovate. Inflorescence paniculate at the top of the stem.—H. spicata *Petrie in Trans. N.Z. Inst.* xix (1887) 325; *Cheesem. Man. N.Z. Fl.* (1906) 150.

North and South Islands, Stewart Island: Abundant throughout, ascending to 4000 ft. Var. *aggregata:* Mountains of Nelson, *H. H. Travers! Buchanan! T. Kirk!* Var. *spicata:* Lake Hawea, *Petrie!*

Schindler has separated the Australian and New Zealand plants associated by Hooker and Bentham under the name of *H. depressa*. The New Zealand species has rather large tetragonous fruit with decidedly large persistent styles, decurved between the calyx-lobes; whereas the Australian plant has small oblong barely tetragonous fruit, and the persistent styles are much smaller and erect. Unfortunately, Schindler applied the name of *depressa* to the Australian plant, overlooking the fact that it was given by A. Cunningham to the New Zealand species, to which it must therefore be restored.

6. **H. uniflora** *T. Kirk in Trans. N.Z. Inst.* ix (1877) 548.—Stems creeping and rooting, often subterranean and putting up numerous densely matted branches forming a compact sward an inch or two in height. Leaves small, opposite, $\frac{1}{8}$–$\frac{1}{3}$ in. long, sessile or shortly petioled, ovate or ovate-oblong to lanceolate, sparingly covered with appressed pilose hairs, thinly or thickly coriaceous, acute, margins thickened and furnished with 2 or rarely 3 sharp serratures on each side. Flowers minute, axillary and opposite, usually 1–2 pairs on a branch, sometimes solitary and terminating the branch, sessile or shortly peduncled. Calyx-tube ovoid, tetragonous, smooth and polished; lobes 4, triangular. Stamens 4 or 8. Fruit shining, smooth and polished, tetragonous, not muricate.—H. uniflora *var.* genuina *Schindler in Pflanzenr.* Heft 23 (1905) 43. H. depressa *var.* serpyllifolia *T. Kirk Students' Fl.* (1899) 149 (*not of Benth. Fl. Austral.* ii (1864) 485); *Cheesem. Man. N.Z. Fl.* (1906) 149. H. depressa *var.* uniflora *Cheesem. in Trans. N.Z. Inst.* xlii (1910) 203.

North and South Islands, Stewart Island: Not uncommon from Rotorua and Taupo southwards. Sea-level to 3500 ft. Flowers most of the year.

In the first edition of this work I kept this as a variety of *H. depressa*, to which it is certainly very closely allied. But it differs in the smaller size, usually narrower leaves, and fewer flowers, which are generally axillary and opposite, but sometimes solitary and terminal.

7. **H. micrantha** *R. Br. ex Sieb. and Zucc. Fl. Jap.* i (1843) 25.—A tufted much-branched procumbent or ascending herb 2–6 in. high; stems and branches slender, wiry, glabrous or slightly scaberulous. Leaves opposite, very shortly petioled, $\frac{1}{8}$–$\frac{1}{3}$ in. diam., broadly ovate or almost orbicular, obtuse or subacute, coriaceous, crenate-serrate, the crenatures broad and rounded. Flowers minute, drooping, in slender almost filiform racemes terminating the branchlets; pedicels very short. Petals 4, more than twice as long as the triangular calyx-lobes. Fruit $\frac{1}{20}$ in. long, broadly oblong, 8-costate, interspaces smooth and shining.—*Hook. f. Handb. N.Z. Fl.* (1864) 66; *Benth. Fl. Austral.* ii (1864) 482; *T. Kirk Students' Fl.* (1899) 149; *Cheesem. Man. N.Z. Fl.* (1906) 150; *Schindler in Pflanzenr.* Heft 23 (1905) 42. H. tenella *Brong. in Driper. Voy. Bot. Coq.* (1829) t. 68, f. B; *Hook. f. Fl. Nov. Zel.* i (1853) 63. H. minima *Col. in Trans. N.Z. Inst.* xviii (1886) 259. Goniocarpus citriodorus *A. Cunn. Precur.* (1839) n. 530.

North and South Islands, Stewart Island: Abundant from the North Cape southwards. Sea-level to 3500 ft. November–January.

Extends through Australia and Malaya to the Himalayas, China, and Japan. All the fruits that I have examined are 1-seeded by abortion.

Cf. reich 23: 89.

2. MYRIOPHYLLUM Linn.

Glabrous marsh or aquatic herbs, branches often floating. Leaves opposite, alternate, or whorled, the lower leaves when submerged often pinnately divided with capillary segments. Flowers usually monoecious, axillary, solitary or spiked. Males: Calyx-tube very short; limb 4- or rarely 2-lobed or wanting. Petals 2–4, concave. Stamens 2, 4, or 8. Females: Calyx-tube deeply 4-grooved; limb wanting, or of 4 minute subulate lobes. Petals minute or wanting. Ovary inferior, 4- or rarely 2-celled; styles 4 or 2, usually recurved or plumose; ovules solitary in each cell. Fruit deeply 4-furrowed, usually separating into 4 dry indehiscent 1-seeded nuts.

A widely distributed genus of from 25 to 30 species, found in fresh waters in nearly all parts of the world. Two of the New Zealand species are endemic, the rest extend to Australia, and one to South America as well.

Leaves whorled; lower pectinately pinnatifid with capillary segments; upper oblong, entire	1. *M. elatinoides.*
Leaves whorled; lower pectinately pinnatifid with capillary segments; upper linear, entire or serrate	2. *M. propinquum.*
Leaves whorled, all pectinately pinnatifid. Nuts large, tubercled	3. *M. robustum.*
Leaves all opposite and entire, $\frac{1}{12}$–$\frac{1}{3}$ in. long, linear. Stems 1–4 in. high. Male flowers seldom more than 2	4. *M. pedunculatum.*
Leaves all opposite and entire, $\frac{1}{10}$–$\frac{1}{5}$ in. long, narrow-oblong. Stems $\frac{3}{4}$–$1\frac{1}{2}$ in. high. Male flowers 2–4	5. *M. Votschii.*

1. **M. elatinoides** *Gaud. in Ann. Sci. Nat.* Ser. i, 5 (1825) 105. —Forming dense masses in still waters. Stems rather stout, 6 in. to 3 ft. long according to the depth of the water. Submerged leaves in whorls of 4, rarely more, deeply pectinately pinnatifid, the segments capillary; the upper emerged or floral leaves in whorls of 4 or 3, sometimes opposite, much smaller, $\frac{1}{5}$–$\frac{1}{3}$ in. long, ovate or oblong to broadly lanceolate, sessile, obtuse, entire or the lower slightly toothed. Male flowers: Calyx-lobes very minute. Petals 4, oblong. Stamens 8. Female flowers: Calyx-lobes and petals apparently wanting. Nuts 4, small, oblong, smooth.—*Hook. f. Fl. Nov. Zel.* i (1853) 63; *Fl. Tasm.* i (1860) 121; *Handb. N.Z. Fl.* (1864) 66; *Benth. Fl. Austral.* ii (1864) 487; *T. Kirk Students' Fl.* (1899) 150; *Cheesem. Man. N.Z. Fl.* (1906) 151; *Schindler in Pflanzenr.* Heft 23 (1905) 91.

North and South Islands, Stewart Island: Common in rivers and lakes from the Auckland Isthmus southwards, ascending to 3500 ft. November–February. Also in Australia and America from Mexico southwards.

Subalpine specimens are stouter, with less delicate and more closely set submerged leaves, and the nuts are rather larger.

2. **M. propinquum** *A. Cunn. Precur.* (1839) n. 532. — Very variable in habit: in lakes and rivers forming masses of floating stems 1–4 ft. long, with numerous submerged leaves; in wet ground sometimes only an inch or two high, with the leaves all linear and entire. Leaves in whorls of 3–8, usually 4–5; submerged leaves deeply and finely pectinately pinnatifid, segments capillary; upper emerged or floral leaves much smaller, $\frac{1}{4}$–$\frac{1}{2}$ in. long, lanceolate and inciso-pinnatifid to narrow-linear and quite entire. Male flowers: Calyx-lobes evident. Petals white. Stamens 8. Female flowers: Calyx-lobes and petals apparently wanting. Nuts 4, very small, linear-oblong, usually minutely scabrid or almost echinate, rarely quite smooth. — *Schindler in Pflanzenr.* Heft 23 (1905) 89. M. variaefolium *Hook. f. in Hook. Ic. Plant.* iii (1840) t. 289; *Fl. Nov. Zel.* i (1853) 64; *Fl. Tasm.* i (1860) 122; *Handb. N.Z. Fl.* (1864) 66; *Benth. Fl. Austral.* ii (1864) 487. M. intermedium *T. Kirk Students' Fl.* (1899) 150 (*not of DC.*).

North and South Islands, Stewart Island: Abundant in lakes and streams, wet swamps, &c., from the North Cape southwards, ascending to 3000 ft. December–March. Also in Australia and Tasmania.

3. **M. robustum** *Hook. f. Handb. N.Z. Fl.* (1864) 67. — Stems stout, erect, branched at the base, 6 in. to 2 ft. high, rarely more. Leaves usually 5 in a whorl, 1–2 in. long, all deeply pectinately pinnatifid; upper rather coarse, usually crowded and overlapping; submerged leaves not often seen, when present with longer capillary segments. Flowers rather large, $\frac{1}{5}$–$\frac{1}{4}$ in. long, solitary or rarely in pairs in the axils of the floral leaves,

with a pair of minute laciniate bracts at the base of each. Calyx-lobes present in both sexes, deltoid, jagged. Petals in the males only, linear-oblong. Stamens 8. Stigmas usually 4, plumose. Nuts 4, $\frac{1}{8}$ in. long, laterally compressed, usually with a single or double row of tubercles down the back, but sometimes smooth and rounded.—*T. Kirk Students' Fl.* (1899) 151; *Cheesem. Man. N.Z. Fl.* (1906) 151; *Ill. N.Z. Fl.* i (1914) t. 46. M. variaefolium *var.* b, *Hook. f. Fl. Nov. Zel.* i (1853) 64.

North Island: In swamps from Ahipara to the Upper Waikato, but often local; apparently rare farther south. Hawke's Bay, *Colenso!* Mungaroa, Wellington, *T. Kirk!* South Island: Awatere, *T. Kirk!* Moutere, Nelson, *T. F. C.;* near Westport, *W. Townson!* Hokitika, *Tipler.* Sea-level to 2000 ft. December–February.

This is seldom found in lakes or streams, and is a marsh-plant rather than a true aquatic. It often covers large stretches in swamps that are quite dry in summer.

4. **M. pedunculatum** *Hook. f. in Lond. Journ. Bot.* vi (1847) 474. —A closely compacted prostrate plant, often forming wide-spreading patches of considerable size. Rhizomes creeping and rooting, putting up many simple or branched suberect or ascending stems 1–3 in. high. Leaves all opposite, $\frac{1}{12}$–$\frac{1}{3}$ in. long, linear, rounded or subacute at the tip, thick and fleshy, quite entire. Flowers unisexual, solitary in the axils of the leaves, each flower with 2 minute ovate-triangular bracteoles. Female flowers in the lower part of the branches, sessile or nearly so; calyx-tube tetragonous, 4-grooved; lobes 4, minute, triangular; styles 4, plumose, spreading, petals wanting. Male flowers just above the females, usually 2, seldom more; calyx-lobes 4, triangular, acute; petals 4, spoon-shaped; anthers 4, rather large. Fruit of 4 nuts connected at the base, usually finely punctate or rugulose.—*Fl. Tasm.* i (1860) 122, t. 23, f. B; *Benth. Fl. Austral.* ii (1864) 489 (*the Australian specimens alone*); *Schindler in Pflanzenr.* Heft 23 (1905).

Chatham Islands: Peaty swamps, apparently not uncommon, *Buchanan, Hawkins, Cockayne!* Sea-level to 500 ft. Also found in Tasmania and northwards through the Australian Alps to New South Wales.

5. **M. Votschii** *Schindler in Pflanzenr.* Heft 23 (1905) 85.—Forming close matted patches. Rhizomes creeping and rooting; stems short, simple or branched, $\frac{3}{4}$–$1\frac{1}{2}$ in. high. Leaves all opposite, narrow-oblong, $\frac{1}{10}$–$\frac{1}{5}$ in. long, broadly rounded at the tip, entire, rather thick and fleshy, the uppermost concave and spoon-shaped. Flowers solitary in the upper axils of the leaves, unisexual; each flower furnished with 2 narrow-triangular bracteoles. Lower flowers female, sessile; calyx-tube tetragonous, 4-grooved; lobes not evident; petals and stamens not present; styles 4, divergent. Male flowers uppermost, usually 2–4; calyx-tube pedicelled, lobes wanting; petals 4, oblong, concave, and thus spoon-shaped, about $\frac{1}{12}$ in. long; stamens 8, anthers large, $\frac{1}{15}$ in. long. Fruit purplish-brown, punctate-rugulose.—M. pedunculatum *Hook. f. Handb. N.Z. Fl.* (1864) 67 (*so far as the New Zealand localities are concerned, but not* M. pedunculatum *of Fl. Tasm.* i (1860) 122, t. 23). So also *T. Kirk Students' Fl.* (1899), *and Cheesem. Man. N.Z. Fl.* (1906) 152.

North and South Islands, Stewart Island: Auckland—North Cape district, *T. F. C., R. H. Matthews! H. Carse!* west coast, near Helensville, Lake Takapuna, Waitakerei River, near the Manukau Heads, *T. F. C.;* Maioro, near Waiuku, *Petrie!* Wellington—Lyall Bay and Miramar, *Buchanan!* Nelson—Cape Farewell, *T. Kirk;* Granity Creek and Buller Valley, near Westport, *W. Townson!* Westland—Okarito,

A. Hamilton. Canterbury—Lake Grassmere, *T. Kirk!* *J. B. Armstrong.* Otago—Taieri Plain, Inch-Clutha, Catlin's, Lumsden, Roxburgh, &c., *Petrie!* Bluff Hill, *T. Kirk!* Lake Hauroko, *Crosby Smith.* Stewart Island: *Thomson, T. Kirk! Cockayne.* Sea-level to 3500 ft.

This is a somewhat critical species, which can only be distinguished from *M. pedunculatum* by the smaller size, shorter and proportionately broader leaves, and by the more numerous male flowers.

3. **GUNNERA** Linn. 1767.

Stemless herbs with creeping rhizomes, often forming broad matted patches. Leaves all radical, petiolate, ovate- or rounded-cordate, coriaceous and fleshy. Flowers small, unisexual or rarely hermaphrodite, in simple or branched spikes or panicles. Male flowers: Calyx-tube imperfect or wanting; lobes 2–3, minute. Petals 2–3 or wanting. Stamens 2–3; filaments filiform; anthers large. Female flowers: Calyx-tube ovoid; lobes 2–3, small. Petals 2–3 or wanting. Ovary 1-celled; styles 2, rarely 4, linear, papillose, stigmatic from the base; ovule solitary, pendulous. Fruit a small fleshy or coriaceous drupe; seed adherent to the pericarp; embryo very minute.

About 30 species are known, nearly 20 of which are found in South America, ranging from Mexico to Chile, Juan Fernandez, Fuegia, and the Falkland Islands. Eight species are endemic in New Zealand, and there are also outlying species in South Africa, Tasmania, Java, and the Sandwich Islands. Several of the American species are remarkable for the large size of their leaves, particularly the Juan Fernandez *G. masafuerae*, in which the leaves are said to be sometimes 10 ft. in diameter. The New Zealand species are still much in need of a thorough revision, which should be based as far as possible upon a study of the various forms in a living state.

* Scapes bisexual; female flowers at the base.

Leaves orbicular-cordate or reniform, usually broader than long, dentate-serrate	1. *G. monoica.* ✓
Leaves orbicular-cordate or ovate-cordate, usually longer than broad, crenate-serrate, strigose	2. *G. strigosa.*
Leaves thin, ovate-cordate. Scapes tall, branched, lax-flowered	3. *G. mixta.*

** Scapes unisexual.

Variable in size, 2–10 in. Leaves ovate or oblong. Fruiting-scapes usually exceeding the leaves. Drupe obconic	4. *G. prorepens.*
Leaves orbicular-cordate, sharply and minutely toothed. Scapes shorter than the leaves. Drupes $\frac{1}{10}$ in., oblong	5. *G. densiflora.*
Leaves narrow-ovate to lanceolate, acute, cuneate at the base, coarsely dentate	6. *G. dentata.*
Leaves thick and fleshy, broadly ovate, obtuse, cuneate at the base, crenate-lobed	7. *G. arenaria.*
Very stout and coriaceous. Leaves deltoid-ovate, minutely toothed, cuneate at the base	8. *G. Hamiltoni.*

1. **G. monoica** *Raoul in Ann. Sci. Nat.* Ser. iii, 2 (1844) 117.—A small perennial herb, spreading over the surface of the ground and forming matted patches. Rhizome perennial, putting out from the nodes creeping and scaly hirsute stolons; roots fibrous, tomentose. Leaves radical and rosulate, long-petioled; petiole $\frac{1}{2}$–$1\frac{1}{2}$ in. long, usually 4 or 5 times as long as the blade, more or less clothed with appressed hairs. Lamina rounded-cordate or reniform, $\frac{1}{2}$–1 in. broad, usually broader than long, obsoletely 3–5-lobed, irregularly dentate-serrate, upper surface thinly hairy, lower surface more so on the veins and margins. Flowers monoecious, on a common peduncle $1\frac{1}{2}$–2 in. long; males occupying the upper $\frac{3}{4}$ of the

panicle, each flower consisting of 2 stamens arising from between 2 minute calyx-lobes and with 2 ciliate bracts at the base. Female flowers clustered on the branches of the peduncle near its base. Calyx-lobes 2, linear; styles 2, very long. Fruit subglobose, $\frac{1}{10}$ in. long, red or whitish-red.—*Raoul Choix* (1846) 15, t. 8; *Hook. f. Fl. Nov. Zel.* i (1853) 66; *Handb. N.Z. Fl.* (1864) 67 (*in part*); *T. Kirk Students' Fl.* (1899) 152 (*in part*); *Cheesem. Man. N.Z. Fl.* (1906) 158; *Schindler in Pflanzenr.* Heft 23 (1905) 108.

Var. **albocarpa** *T. Kirk l.c.*—Larger and stouter, rhizome sometimes as thick as a goose-quill. Leaves larger, sometimes 1½ in. diam. Panicles 3–6 in.; much branched; branches long. Fruit globose, white, tipped with the black calyx-lobes.—G. albocarpa *Cockayne in Report Bot. Stewart Id.* (1909) 43.

North and South Islands, Stewart Island, Chatham Islands: From the Auckland Isthmus southwards; but as the following species has often been confused with it, it is difficult to trace its exact distribution at present. It was originally discovered at Akaroa by Raoul. Var. *albocarpa:* Arthur's Pass, *Spencer!* Haast Pass, *Poppelwell;* Clinton Valley, *Cockayne;* common in Southland, *Crosby Smith;* near the Bluff Hill, *T. Kirk!* Stewart Island: *T. Kirk! Cockayne.*

In the above description I have followed Schindler in limiting *G. monoica* to the plant originally described and figured by Raoul, including also those forms which agree with it in the small size, almost glabrous habit, and in the leaves being acutely toothed and broader than long. I have kept var. *albocarpa* as a variety of *G. monoica*, but it has good claims to be considered a distinct species.

2. **G. strigosa** *Col. in Trans. N.Z. Inst.* xv (1883) 322.—Very variable in size. Rhizome perennial, woody, putting out from the nodes creeping stolons 2–6 in. long or more, and thus forming matted patches of considerable size. Leaves crowded and rosulate at the nodes, petiolate; petioles 1–3 in. long, channelled above, rounded beneath, strigose with appressed linear whitish hairs; lamina ½–1½ in. diam., orbicular-cordate, more or less distinctly 5–8-lobed with the lobes crenate-toothed, 5–7-nerved from the base, sparsely pilose with appressed linear hairs above, much more thickly clothed on the veins and margins beneath. Flowers monoecious, in long slender panicles usually far exceeding the leaves. Female flowers near the base of the panicle, and clustered on the branches thereof. Calyx-lobes 2, linear, acute. Styles 2, very long. Male flowers occupying ¾ of the length of the panicle, which towards the top is reduced to a simple spike. Calyx-lobes 2, minute. Stamens 2. A few hermaphrodite flowers are usually placed between the male and the female. Fruit globose, $\frac{1}{10}$ in. diam.; bright-red or reddish-white.—*Schindler in Pflanzenr.* Heft 23 (1905) 110. G. monoica *var.* strigosa *T. Kirk Students' Fl.* (1899) 152; *Cheesem. Man. N.Z. Fl.* (1906) 154.

North and South Islands, Stewart Island: Not uncommon in moist shaded places from Mangonui southwards. Sea-level to 3500 ft. November–January.

Not easily distinguished from the preceding species, but a coarser and stouter plant, with more coriaceous and much more strigose leaves, which are bluntly crenate-toothed, and seldom acutely toothed, as in *G. monoica.* It appears to be a more widely distributed species than *G. monoica.*

3. **G. mixta** *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 344.—Rhizomes slender, creeping. Leaves tufted, 2–4 in. long; petiole slender, hairy or strigose; blade about 1 in. long, broadly ovate or ovate-cordate, obtuse, crenate or crenate-lobed, both surfaces with scattered white hairs. Peduncles very slender, exceeding the leaves, 1–5 in. long, usually much branched below,

rarely simple; upper $\frac{2}{3}$ or more male, lower $\frac{1}{3}$ female. Male flowers sessile on the branches or very shortly pedicelled, each with 2 narrow concave deciduous bracts. Sepals 2, minute, linear. Stamens 2; filaments often as long as the small broadly oblong obtuse anthers. Female flowers: Calyx-lobes 2, minute. Styles very long and slender, filiform. Persistent fruiting portion of the peduncle shorter than the leaves, often inclined. Drupes small, sessile, ovoid-globose, red or yellow, about $\frac{1}{10}$ in. long.—*Students' Fl.* (1899) 152; *Schindler in Pflanzenr.* Heft 23 (1905) 109. G. microcarpa *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 153; *Students' Fl.* (1899) 153; *Cheesem. Man. N.Z. Fl.* (1906) 154. G. ovata *Petrie in Trans. N.Z. Inst.* xxv (1893) 274 (*in part*).

South Island: Otago and Southland, not uncommon, *T. Waugh! Petrie! B. C. Aston!* December–January.

In the first edition of this work I pointed out that Kirk's two species *G. mixta* and *G. microcarpa* are one and the same plant, *G. mixta* being founded mainly on flowering specimens, and *G. microcarpa* on fruiting. I selected *microcarpa* as the name to be kept; but in the meantime Schindler, who in his monograph of the family had come to a similar conclusion, had adopted the name of *G. mixta*, which under the law of priority must be retained. The distinguishing characters of the species are the tall slender lax-flowered usually branched flowering stems, the upper part of which is male and the lower female; the small broad anthers, on rather long filaments; and the small almost globose drupe. It is probably a widely distributed plant.

4. **G. prorepens** *Hook. f. Fl. Nov. Zel.* i (1853) 66.—Very variable in size, according to locality and surroundings. Rhizome stout or slender, putting out stolons 4–8 in. long or more. Leaves rosulate, crowded; petioles 1–6 in. long, slender, glabrous or sparingly pilose; blade $\frac{1}{2}$–2 in. long, ovate to elliptic-ovate or oblong, cordate or rounded or truncate at the base, obtuse, crenate or sinuate-crenate or almost entire, submembranous, glabrous or slightly hairy. Flowers unisexual, dioecious, spicate at the top of a long slender peduncle varying in length from 1 to 8 in. and naked below. Male flowers laxly placed on short pedicels, each pedicel with a linear bract at the base and 2 linear cucullate deciduous bracteoles just under the flower. Sepals 2, subulate. Stamens 2; filaments very short. Female flowers more densely placed, on a shorter peduncle which lengthens during the ripening of the fruit. Calyx-teeth 2, short; styles 2, thick and fleshy. Fruiting-peduncles usually exceeding the leaves, often coloured and somewhat fleshy. Drupes $\frac{1}{8}$ in. long, red or yellowish or glaucous, obconic or nearly globose.—*Handb. N.Z. Fl.* (1864) 68 (*excl. var.* b); *Schindler in Pflanzenr.* Heft 23 (1905) 116; *T. Kirk Students' Fl.* (1899) 153; *Cheesem. Man. N.Z. Fl.* (1906) 155. G. flavida *Col. in Trans. N.Z. Inst.* xviii (1886) 260. G. ovata *Petrie in Trans. N.Z. Inst.* xxv (1893) 274 (*in part*).

North Island: Hilly and subalpine wet localities from the Lower Waikato southwards. South Island, Stewart Island: Not uncommon in *Sphagnum* swamps throughout. Sea-level to 3500 ft.

I have followed the Kew authorities and Dr. Schindler in uniting Colenso's *G. flavida* with *G. prorepens*. The difference between the two plants is purely one of size, and they can be traced into one another in many localities.

5. **G. densiflora** *Hook. f. Handb. N.Z. Fl.* (1864) 68.—Rhizome short, stout, creeping, rooting at the nodes, 2–4 in. long. Leaves clustered at the nodes and forming rosettes 2–4 in. across; petiole 1–1½ in. long, as long or longer than the blade, slightly concave above, rounded beneath, densely

pilose; blade ½–1 in. long, ovate-cordate to nearly orbicular, sharply and coarsely serrate-dentate, sparsely pilose above and along the veins beneath, margins more or less pilose; veins palmate. Flowers unisexual. Male flowers on axillary densely pilose peduncles 1–2½ in. long, sometimes with a few females at the base, very shortly stalked, bracteate; sepals 2, linear-triangular; petals 2, narrow-spathulate; stamens 2, anthers broadly oblong. Female flowers densely clustered on a short peduncle at first sunk in the axils of the leaves but which elongates as the fruit ripens; sepals 2, narrow-linear; petals wanting. Fruit linear obconic or pyriform, $\frac{1}{10}$ in. long, reddish. — *T. Kirk Students' Fl.* (1899) 154; *Cheesem. Man. N.Z. Fl.* (1906) 156; *R. M. Laing in Trans. N.Z. Inst.* xliv (1912) 65; *Cockayne l.c.* 1 (1918) 174; *Schindler in Pflanzenr.* Heft 23 (1905) 111.

South Island: Nelson—Acheron and Clarence Rivers, alt. 4000 ft., *W. T. L. Travers;* Lake Tennyson, *T. F. C., R. M. Laing!* Canterbury—Craigieburn Mountains, *Cockayne! A. Wall.* 2500–4500 ft. T. So. 173.

Under the name of *G. densiflora* I have for the present included not only the original plant of Hooker, but another collected by Mr. Laing and myself at Lake Tennyson, which is considerably larger, but does not seem to differ in any other character of importance. Both are very closely allied to the Tasmanian *G. cordifolia*, and I should have referred them to that species but for the fact that the fruit of *G. cordifolia* is described by Hooker in the "Flora Tasmaniae" as "aggregated into a head as large as a raspberry, bright-red, trigonous," a description which does not at all suit the New Zealand plant.

6. **G. dentata** *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 346.—Forming extensive patches in watery subalpine localities. Rhizome stout, much branched, clothed with the bases of the old leaves. Leaves numerous, densely tufted, 1–3 in. long; petioles long, broad and flat, usually clothed with strigose hairs, sometimes almost shaggy; blade ⅓–1 in. long, ovate or elliptic-oblong or elliptic-lanceolate, acute, rounded or cuneate at the base, often narrowed into the petiole, coarsely dentate, both surfaces with scattered white hairs or almost glabrous. Spikes unisexual. Male spikes slender, about equalling the leaves; flowers sessile or nearly so, each with a pair of deciduous hood-shaped bracts. Sepals 2, minute, linear. Anthers broadly oblong. Female spikes very short, hidden at the base of the leaves; flowers densely crowded. Calyx-lobes 2, linear. Styles 2, very long, flattened at the base. Fruiting-spikes sometimes elongated and exceeding the leaves, sometimes short and sessile among the leaves. Drupes sessile or nearly so, clavate, spreading or pendulous, $\frac{1}{10}$ in. long.—*Students' Fl.* (1899) 154; *Cheesem. Man. N.Z. Fl.* (1906) 156. G. prorepens *var.* b *Hook. f. Handb. N.Z. Fl.* (1864) 68.

North Island: *Colenso*, locality not stated, but probably the Ruahine Mountains; Taupo, *Petrie!* Kaimanawa Mountains, *B. C. Aston!* Karioi, western side of Ruapehu, *Spencer!* South Island: Marlborough—Pelorus Valley, *J. H. Macmahon.* Nelson—Lake Rotoiti, *T. F. C.;* vicinity of Westport, *W. Townson!* Lake Tennyson, *R. M. Laing!* Canterbury—Kowai River and Lochinvar, *Cockayne;* Upper Waimakariri, *T. Kirk, Berggren!* Hooker Valley, *T. F. C.;* Mount Arrowsmith, *Cockayne* and *R. M. Laing.* Otago—Lake Wanaka, Lake Hawea, Matukituki Valley, Hunter River, head of Lake Wakatipu, *Petrie!* near Lumsden, *B. C. Aston;* Haast River and Makaroro, *Poppelwell;* Dart and Routeburn Valleys, *Crosby Smith.* 500–4500 ft. December–February.

A distinct species, easily recognized by the narrow-ovate or elliptic-oblong acute leaves, which are often cuneate at the base, and coarsely dentate.

7. **G. arenaria** *Cheesem. ex T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 348.—A stout much-branched prostrate and matted herb, forming extensive patches in damp sandy soil; rhizome stout, clothed with the ragged bases of the old leaves. Leaves $\frac{3}{4}$–$2\frac{1}{2}$ in. long, thick and coriaceous, almost fleshy; petioles long, stout, sheathing at the base, glabrous or with a few scattered flattened hairs; blade $\frac{1}{3}$–$\frac{3}{4}$ in., broadly ovate or elliptic-ovate or oblong, obtuse, cuneate at the base or truncate or almost cordate, coarsely crenate or crenate-lobed; veins prominent beneath. Peduncles variable in size, unisexual; males usually longer than the leaves, stout, $1\frac{1}{2}$–3 in. long. Flowers sessile or nearly so, with 1–2 linear cucullate bracts. Anthers 2, sessile, broadly oblong. Female peduncles in the flowering stage short and hidden among the leaves. Flowers densely crowded, forming a short oblong spike. Calyx-lobes 2–3, minute. Styles long, stout, subulate. Fruiting-peduncles either remaining short and concealed by the leaves, or greatly elongated and exceeding them, $1\frac{1}{2}$–3 in. long, in that case becoming stout succulent and coloured. Drupes $\frac{1}{6}$–$\frac{1}{5}$ in. long, fleshy, yellowish-red, clavate and pendulous or obovoid and suberect.—*Students' Fl.* (1899) 154; *Cheesem. Man. N.Z. Fl.* (1906) 156. G. densiflora *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 346 (*not of Hook. f.*).

North Island: Moist places on sand-dunes on the western coast, from Cape Maria van Diemen to Port Waikato, *T. F. C., Petrie! R. H. Matthews! H. Carse!* from Cape Egmont to Hawera and Patea, *T. F. C., Mrs. F. Mason!* from Patea to Waikanae, *Cockayne, B. C. Aston!* South Island: Cape Farewell, *T. Kirk!* New Brighton, *Cockayne;* Forty-miles Beach, *H. H. Allan!* Fortrose, *B. C. Aston!*

Allied to *G. dentata*, but easily separated by the stouter and more glabrous habit, broader rounder and more fleshy obtuse leaves, stouter peduncles, and larger fruit.

8. **G. Hamiltoni** *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 347.—A stout coriaceous much-branched plant forming broad matted patches; rhizomes as thick as a goose-quill. Leaves numerous, tufted, forming broad flat rosettes 2–4 in. diam., coriaceous; petioles broad and flat, almost winged, sheathing at the base, glabrous or slightly villous; blade $\frac{1}{2}$–1 in. long, ovate or ovate-deltoid, cuneate at the base, acute, closely and minutely toothed, glabrous; veins prominent below. Spikes unisexual; males stout; flowers lax, sessile. Female spikes at first hidden among the leaves; flowers crowded; bracts broadly ovate, laciniate. Fruiting-spikes 2–4 in. long; drupes fleshy, clavate, red.—*Students' Fl.* (1899) 155; *Cheesem. Man. N.Z. Fl.* (1906) 157.

South Island: Hills near the mouth of the Oreti River, Southland, *W. S. Hamilton!* Stewart Island: Mason Bay, *W. Traill.*

A very remarkable plant, quite unlike any other, although undoubtedly allied to *G. arenaria*. I have only seen very fragmentary flowering specimens.

Family LXXVI. **ARALIACEAE.**

Trees or shrubs, rarely herbs. Leaves alternate or very rarely opposite, simple or digitately or pinnately divided, often large; stipules adnate to the base of the petiole or wanting. Flowers regular, hermaphrodite or polygamous or dioecious, usually arranged in simple or compound umbels, less often in racemes or panicles. Calyx-tube adnate to the ovary; limb truncate or toothed or almost obsolete. Petals usually 5, seldom 4 or more than 5, valvate or slightly imbricate. Stamens as many as the

petals, and inserted with them round the margin of an epigynous disc; filaments usually inflexed. Ovary inferior, 2- to many-celled, rarely 1-celled; styles as many as the cells, free or connate; ovules solitary, pendulous, anatropous. Fruit drupaceous, indehiscent; epicarp usually succulent; cells 2 to many, 1-seeded. Seeds pendulous; testa membranous; albumen copious, fleshy; embryo minute, radicle next the hilum.

A family very closely allied to *Umbelliferae*, principally differing in the arborescent habit, valvate petals, ovary usually more than 2-celled, and succulent fruit. The species are mainly tropical or subtropical, few of them extending into the temperate zones. Genera 50; species about 650. The properties of the family are unimportant. Of the 5 genera found in New Zealand, *Stilbocarpa* is endemic; *Nothopanax* has its chief centre of distribution in New Zealand, but has a few outlying species in Polynesia, Australia, and Malaya; *Meryta*, with the exception of the single species found in New Zealand and another in Queensland, is predominantly Polynesian and Melanesian; *Schefflera* is a large genus abundant in the tropics of both hemispheres with a single outlying species in New Zealand; while *Pseudopanax* is mainly New Zealand, but has two or three representatives species in South America.

* Herbaceous, with broad orbicular-reniform leaves. Petals imbricate.

Fruit globose or hollowed at the top .. .. .. 1. STILBOCARPA.

** Shrubs or trees. Petals valvate. Stamens equal in number to the petals.

Leaves simple or digitate. Ovary 2-celled, rarely 3–4-celled.
Styles distinct, recurved at the apex .. .. .. 2. NOTHOPANAX.
Leaves simple, very large. Flowers paniculate .. .. 3. MERYTA.
Leaves digitate. Umbels small, racemed on the branches of a large spreading panicle .. .. 4. SCHEFFLERA.
Leaves simple or digitately divided. Ovary usually 5-celled.
Styles very short, connate into a cone or column .. .. 5. PSEUDOPANAX.

1. STILBOCARPA A. Gray. 1854.

Large and stout much-branched herbs. Rhizome long, thick and fleshy, wide-creeping. Stems branched from the base, 2–3 ft. high or more. Leaves large; petioles long, fistulose, setose or pubescent, furnished with broad membranous sheaths at the base. Umbels terminal and axillary, compound, forming a globose head 6–10 in. diam., involucral bracts foliaceous. Flowers polygamo-monoecious, jointed on the top of the pedicel. Calyx-tube 2–4-grooved; limb almost obsolete. Petals 5, linear or obovate, obtuse or acute. Stamens 5; filaments long or short; anthers ovate. Disc annular, fleshy, 3–4-lobed. Ovary either 3–4-celled or 2-celled; styles as many as the cells, straight or recurved. Fruit globose or depressed-globose, flat or hollowed at the apex. Seeds as many as the cells, ovoid; albumen copious.

A very remarkable and distinct genus, composed of three species restricted to Stewart Island and the islands to the south of New Zealand. Although distantly allied to *Aralia*, it has no near relatives in South America or Australia.

A. Stillbocarpa. *Ovary 3–4-celled. Fruit hollowed at the apex.*

Stolons not developed. Upper surface of leaves usually clothed with stout bristly hairs. Flowers yellowish-green with a purplish centre .. .. 1. *S. polaris.*

B. Kirkophytum. *Ovary 2-celled. Fruit globose, not hollowed at the apex.*

Arcuate stolons strongly developed. Upper surface of leaves nearly glabrous. Flowers reddish-purple .. .. .. 2. *S. Lyallii.*
Stolons not developed. Upper surface of leaves nearly glabrous. Flowers yellowish .. .. 3. *S. robusta.*

1. **S. polaris** *A. Gray Bot. U.S. Expl. Exped.* (1854) 714.—Forming large rounded masses 3–5 ft. in diam., more or less bristly in all its parts. Rhizome prostrate, 2–3 ft. long, thick and fleshy, annulate. Stems much branched below, stout, 1–1½ in. diam., grooved, succulent, with a heavy rank smell when bruised. Leaves bright-green, 9–18 in. diam., orbicular-reniform, thick and fleshy, bristly on both surfaces, plaited or rugose, margins many-lobed and sharply toothed, veins flabellate; petiole 12–24 in. long, erect, semi-terete; sheath amplexicaul, produced above into a leafy lobed or laciniate membranous ligule. Umbels large, terminal and axillary, compound. Flowers very numerous, ¼ in. diam., waxy-yellow with a purplish centre, shining. Fruit the size of a small peppercorn, globose with a flattened and hollowed apex, brilliantly shining.—*Hook. f. Handb. N.Z. Fl.* (1864) 100; *T. Kirk Students' Fl.* (1899) 215; *Cheesem. Man. N.Z. Fl.* (1906) 227; *Ill. N.Z. Fl.* i (1914) t. 70 (inflorescence). Aralia polaris *Homb. et Jacq. Voy. au Pôle Sud Bot.* t. 2, *Phanerog.*; *Hook. f. Fl. Antarct.* i (1844) 19; *Ic. Plant.* (1844) t. 747.

Auckland, Campbell, Antipodes, and Macquarie Islands: Abundant from sea-level to a considerable height on the hills; *Hooker* and all subsequent collectors. December–February.

A truly noble plant. Hooker well remarks that it is "one of the most handsome and singular of the vegetable productions in the group of islands it inhabits, which certainly contains a greater proportion of large and beautiful plants, relatively to the whole vegetation, than any country with which I am acquainted. Growing in large orbicular masses, on rocks and banks near the sea, or amongst the dense and gloomy vegetation of the woods, its copious bright-green foliage and large umbels of waxy flowers, often nearly a foot in diameter, have a most striking appearance."

2. **S. Lyallii** *J. B. Armstrong in Trans. N.Z. Inst.* xiii (1881) 336.—A stout herb 1–4 ft. high, often forming extensive patches. Rhizome prostrate or arcuate, creeping. Stems stout, as thick as the little finger, pilose. Leaves radical, crowded, 6–18 in. diam. or more, orbicular-reniform, lobed and deeply toothed, usually glabrous and shining above, more or less clothed with soft bristles beneath; petiole terete, fistulose, with a broad membranous sheathing ligule at the base. Umbels large, compound, forming globose masses 6–12 in. diam. Flowers monoecious or polygamous, ¼ in. diam., reddish-purple. Calyx-margin truncate. Petals 5, linear or linear-oblong. Ovary 2-celled, crowned by two broad and fleshy stylopodia; styles 2, free. Fruit globose, ⅙ in. diam., 2-celled, black and shining; seeds 1 in each cell.—*Cheesem. in Subantarct. Is. of N.Z.* ii (1909) 409; *Ill. N.Z. Fl.* i (1914) t. 70 (leaf). Aralia Lyallii *T. Kirk in Trans. N.Z. Inst.* xvii (1885) 293, t. 17; *Students' Fl.* (1899) 216.

South Island: Coal Island, Preservation Inlet, *T. Kirk.* Stewart Island and Adjacent Islands: *Lyall, Petrie! Thomson! T. Kirk! Cockayne,* and others.

Has precisely the habit of *Stilbocarpa polaris,* and in a flowerless state may easily be taken for it. The leaves are less fleshy and coriaceous, and want the bristles on the upper surface; the petioles are terete; the flowers reddish-purple, with narrower petals; the ovary 2-celled, crowned with the very evident stylopodia; and the fruit is not hollowed at the apex.

3. **S. robusta** *Cockayne in Subantarct. Is. of N.Z.* (1909) 209.—Closely allied to *S. Lyallii*, but larger and stouter, and much less hispid. Stolons absent. Leaves often 2 ft. in diam.; petioles much stouter, flat on the upper surface, and convex beneath, thus plano-convex in section, and almost solid, not terete and fistulose, as in *S. Lyallii.* Umbels as large as those

of *S. Lyallii*, but the individual flowers are smaller, and almost pale-yellow in colour, never reddish-purple. Aralia Lyallii *var.* robusta *T. Kirk in Journ. Bot.* xxix (1891) 237; *Students' Fl.* (1899) 216; *Cheesem. Man. N.Z. Fl.* (1906) 227.

The Snares (about 65 miles south-west from Stewart Island): Apparently not uncommon, *T. Kirk! Cockayne*, and others.

Of this fine plant I have only seen a single very imperfect specimen. It was placed by Mr. Kirk as a variety of *S. Lyallii*, but the notes respecting it given by him in his paper on the botany of The Snares and the opinions expressed by subsequent visitors have convinced me that the plant fully deserves the rank of a species.

See Kew Bull 1933: 154–5.
Pseud. linear. & Colensoi.

2. **NOTHOPANAX** Miquel 1855.

Evergreen trees or shrubs, usually glabrous or nearly so. Leaves often polymorphous in the same species. Usually the leaves of juvenile plants are 3–5-foliolate, with the leaflets more or less cut or divided; while the leaves of the mature plants are 3–5-foliolate with the leaflets less or not all divided; or they may be altogether simple. Leaves and leaflets coriaceous, usually dentate, serrate, or pinnately divided. Flowers usually in umbels, which may be simple or compound. Calyx-limb entire or 5-toothed. Petals 5, valvate. Stamens 5. Ovary 2- or rarely 3–4-celled; styles as many as the cells, free or connate at the base, their tips free, ultimately recurved. Fruit laterally compressed or rarely almost globose, 2–4-celled; exocarp succulent or coriaceous. Seeds 1 in each cell.

A small and somewhat ill-defined genus of 12 to 15 species, 10 of which are found in New Zealand, the remainder being scattered through Polynesia, Australia, and Malaya.

* Leaves of both old and young plants simple.

Leaves of young plants narrow-linear, 5–10 in. long; of old plants linear or lanceolate, 2–3 in.	1. *N. lineare.* (×)

** Leaves of old plants simple; of young ones 3–5-foliolate.

Leaflets 2–5 in., lanceolate, serrate. Styles 2	2. *N. simplex.*
Leaflets 2–8 in., oblong-lanceolate, entire. Style 3–4	3. *N. Edgerleyi.*
Leaflets small, $\frac{1}{3}$–$\frac{2}{3}$ in., orbicular or obovate. Styles 2	4. *N. anomalum.*
Leaflets larger, $\frac{1}{2}$–2 in., oblong-ovate	5. *N. parvum.*

*** Leaves of old plants 3–5- or 7-foliolate.

Leaves always 3-foliolate, much more coriaceous than in *N. Sinclairii.* Umbels larger	6. *N. Macintyrei.*
Leaves 3–5-foliolate; petioles not sheathing. Umbels small. Fruit compressed	7. *N. Sinclairii.*
Leaves 3–5-foliolate; petioles sheathing; leaflets sessile, veins indistinct. Umbels large, compound	8. *N. Colensoi.*
Leaves 3–7-foliolate; leaflets stalked, 3–8 in. long, thinly coriaceous, midribs and petioles not reddish-purple. Umbels large, compound	9. *N. arboreum.*
Leaves 3–7-foliolate; leaflets stalked, much larger, 6–12 in. long, more coriaceous, midribs and petioles dark reddish-purple. Umbels large, compound	10. *N. laetum.*

(Hook. f.)

1. **N. lineare** *Harms in Engl. and Prantl. Pflanzenfam.* iii, 8 (1894) 48.—A small sparingly branched shrub 5–10 ft. high; branches spreading, stout and woody, bearing numerous simple or trifid coriaceous scales mixed with the leaves. Leaves of young trees crowded, ascending, simple, 5–10 in. long, $\frac{1}{5}$–$\frac{1}{3}$ in. wide, narrow-linear, acute, gradually narrowed into a short

(×) Pseudopanax linearis (Hook. f.) C. Koch, 1859.
T. 43: 74. 56: 189.
N. bermudaensis Olivier T. 56: 4.

T. 5-7(1926)71. N. colensoi × simplex. N. anomalum × "

stout petiole, remotely and obscurely sinuate-serrate, excessively thick and coriaceous, midrib and margins thickened. Leaves of mature trees 2–4 in. long, ½–¾ in. wide, linear or linear-lanceolate, obtuse or acute, obscurely serrate, very thick and coriaceous, midrib and margins thickened; petiole short, ⅛–⅙ in. long, jointed on to the branch. Flowers small, dioecious. Umbels usually terminal, but occasionally axillary as well, compound, shorter than the leaves; rays 3–7, bracteolate. Ovary 3–5-celled; styles the same number as the cells, connate at the base, free and recurved at the tips. Fruit broadly ovoid, 3–5-celled and -seeded.—Panax lineare *Hook. f. Fl. Nov. Zel.* i (1853) 93; *Handb. N.Z. Fl.* (1864) 101; *T. Kirk Students' Fl.* (1899) 217; *Cheesem. Man. N.Z. Fl.* (1906) 228; *Ill. N.Z. Fl.* i (1914) 71.

South Island: Subalpine forests from Collingwood to Preservation Inlet, chiefly on the western side of the Southern Alps. Altitudinal range usually between 2500 and 4500 ft., but descends to low levels in the sounds of the south-west coast of Otago. January–February.

The foliage of the young seedling is very narrow-linear, from 2–3 in. long, with a breadth of about ¼ in. As the plant increases in size, the leaves also increase in length, so that a young tree 4 or 5 ft. high frequently has leaves 10 in. long by ⅓ in. wide. In older stages the leaves gradually become shorter, so that in flowering examples they are often less than 2 in. long, with a breadth of ½ in. to ¾ in. The leaf-change through which the species passes is thus somewhat similar to that of *Pseudopanax crassifolium*; but is not so conspicuous, and the leaves of the young plant are never deflexed.

(Journ. B.)

2. **N. simplex** *Seem. in Journ. Bot.* iv (1866) 296.—A shrub or small tree 8–25 ft. high, everywhere smooth and glabrous. Leaves of mature trees 1-foliolate, variable in size, 2–5 in. long, lanceolate or oblong- or obovate-lanceolate, coriaceous and glossy, acute or acuminate, rarely obtuse, sharply serrate or nearly entire; petiole 1–3 in. long, jointed at the top. Leaves of young plants differing greatly at various periods of growth or in various localities; of young seedlings ovate or broadly ovate, coarsely serrate or lobed. These are either followed by 3–5-foliolate leaves with the leaflets long and narrow and deeply cut or almost pinnatifid, or pass into 3-foliolate leaves with the leaflets broader and often variously lobed. Finally, the leaflets become narrower, the serratures less prominent, and the lateral leaflets disappear, the plant thus assuming its mature foliage. Umbels small, shorter than the leaves, axillary or terminal, irregularly compound; secondary umbels 8–16-flowered, the terminal one usually female, the lateral male. Flowers small, greenish-white. Ovary 2-celled; styles 2, free to the base, recurved. Fruit ⅛ in. diam., orbicular, compressed; seeds 2.—Panax simplex *Forst. f. Prodr.* (1786) n. 399; *A. Rich. Fl. Nouv. Zel.* (1832) 280, t. 31; *A. Cunn. Precur.* (1839) n. 509; *Raoul Choix* (1846) 46; *Hook. f. Fl. Antarct.* i (1844) 18, t. 12; *Fl. Nov. Zel.* i (1853) 93; *Handb. N.Z. Fl.* (1864) 100; *T. Kirk Forest Fl.* (1889) tt. 106, 107; *Students' Fl.* (1899) 217; *Cheesem. Man. N.Z. Fl.* (1906) 229.

Var. **quercifolium** *T. Kirk Students' Fl.* (1899) 217.—Leaves of mature plants 1-foliolate, 3–5 in. long, deeply lobulate or pinnatifid.—*Forest Fl.* (1889) t. 106, f. 2. Probably a permanent juvenile form.

North and South Islands, Stewart Island, Auckland Islands: From the Thames goldfields southwards, but local north of the East Cape. Var. *quercifolium*: Canterbury—Upper Waimakariri, *J. D. Enys!* Sea-level to over 4000 ft. *Haumakaroa.* November–January.

The remarkable series of changes through which the foliage of the young plants passes is well worth careful study.

3. **N. Edgerleyi** /*Harms in Engl. and Prantl. Pflanzenfam.* iii, 8 (1894) 48.—A small graceful tree 20–40 ft. high; trunk 12–18 in. diam. Leaves very aromatic, bright glossy green, smooth and shining, membranous, dimorphic: of mature plants 1-foliolate; petiole jointed to the blade, slender, 1–3 in. long; blade 2–8 in., oblong- or obovate-lanceolate to lanceolate, acute or acuminate, quite entire: of young plants 3–5-foliolate with the leaflets deeply and irregularly lobed or pinnatifid. Umbels small, $\frac{1}{2}$–$\frac{3}{4}$ in. diam., 10–12-flowered, in slender axillary or lateral panicles 1–2 in. long. Flowers small, greenish-white. Ovary 3–4-celled; styles as many as the cells, connate at the base. Fruit $\frac{1}{8}$ in. diam., globose; seeds 3–4.—Panax Edgerleyi *Hook. f. Fl. Nov. Zel.* i (1853) 94; *Handb. N.Z. Fl.* (1864) 101; *T. Kirk Forest Fl.* (1889) t. 44; *Students' Fl.* (1899) 217; *Cheesem. Man. N.Z. Fl.* (1906) 229. Raukana Edgerleyi *Seem. in Journ. Bot.* iv (1866) 352.

North and South Islands, Stewart Island: Not uncommon in hilly forests from Kaitaia and Hokianga southwards. Sea-level to 2500 ft. *Raukawa; Houmangaroa; Koareare* (the juvenile plant). January–February.

A remarkably graceful and handsome species. The Maoris formerly mixed the fragrant leaves with fat or oil, and then used the mixture for anointing the person.

4. **N. anomalum** /*Seem. in Journ. Bot.* iv (1866) 296.—A much-branched shrub 5–12 ft. high; branches spreading at right angles, younger ones usually clothed with small bristly scales. Leaves of young plants 3-foliolate; petioles long, slender, winged; leaflets jointed on to the petiole, stipellate at the base, elliptic-ovate or orbicular-ovate, sometimes lobed, toothed or crenate, usually membranous. Leaves of mature plants 1-foliolate; petiole very short, seldom more than $\frac{1}{8}$ in. long; leaflet $\frac{1}{3}$–$\frac{2}{3}$ in. long, orbicular or oblong-orbicular, rarely narrower and oblong-obovate, rounded at the tip, obscurely crenate, rather coriaceous, usually with minute linear stipellae at the base. Umbels small, simple, axillary, 2–8-flowered; peduncles very short. Flowers minute, greenish. Ovary 2-celled; styles 2, free. Fruit $\frac{1}{8}$–$\frac{1}{6}$ in. diam., orbicular, much compressed, 2-celled, mottled.—Panax anomalum *Hook. in Lond. Journ. Bot.* ii (1843) 422, t. 12; *Hook. f. Fl. Nov. Zel.* i (1853) 93; *Handb. N.Z. Fl.* (1864) 101; *T. Kirk Students' Fl.* (1899) 218; *Cheesem. Man. N.Z. Fl.* (1906) 230; *Ill. N.Z. Fl.* i (1914) t. 72.

Var. **microphyllum** *T. Kirk l.c.*—Smaller and more slender. Leaves smaller, $\frac{1}{5}$–$\frac{1}{3}$ in. long, obovate-lanceolate to broadly obovate, sinuate-crenate.—P. microphyllum *Col. in Trans. N.Z. Inst.* xvi (1884) 328.

North and South Islands: Not uncommon in woods from Mangonui and Kaitaia southwards, ascending to 2500 ft. *Wauwaupaku.* December–February.

A very curious plant, with the habit of *Melicytus micranthus* or *Melicope simplex*, quite unlike a *Panax*. Mr. Colenso's *P. microphyllum* is the common form south of the Waikato, but it differs little from the type.

5. **N. parvum** /*Cockayne in Report Bot. Stewart Id.* (1909) 43.—A slender branching shrub 6–12 ft. high; branches numerous, twiggy, when young more or less clothed with short bristly hairs; bark greyish-brown or dark-brown. Leaves very variable in size, $\frac{1}{2}$–2 in. long including the petiole; blade oblong to oblong-ovate or broadly ovate, acute or subacute, crenate or serrate or slightly lobed, texture rather firm but not coriaceous, not smooth or shining; petiole rather long, slender, jointed on to the blade, and there usually furnished with minute stipellae. Leaves of young plants 3-foliolate with serrate leaflets, which are occasionally lobed. Umbels

simple or compound, small but often very numerous, lateral or terminating the branchlets, few-flowered; flowers much as in *N. simplex* but smaller. Fruit-reniform, $\frac{1}{6}$ in. diam., much compressed, styles 2. Seeds 2.—Panax simplex var. parvum *T. Kirk Students' Fl.* (1889) 217; *Cheesem. Man. N.Z. Fl.* (1906) 229.

North and South Islands, Stewart Island: Waimarino Forest, near Ohakune, *E. Phillips Turner;* Mount Arthur Plateau, *T. F. C.;* Otira Valley, *Petrie!* Upper Rakaia, *Cockayne;* Franz Josef Glacier, *Cockayne;* Clinton Valley, *Petrie!* Not uncommon in Stewart Island, *Cockayne!* Sea-level to 3000 ft.

This was placed by Mr. Kirk as a variety of *N. simplex*, but it appears to me to be much nearer to *N. anomalum*, of which it has the setose branchlets, but from it differs in the larger and proportionately narrower leaves.

T. 56: 12

6. **N. Macintyrei** *Cheesem. n. sp.*—A much-branched shrub or small tree, probably not exceeding 10–15 ft. high at the most, perfectly glabrous in all its parts. Bark greyish, that of the branchlets often with a purplish tinge. Leaves 3-foliolate in all the specimens seen; petiole $\frac{1}{2}$–$1\frac{1}{2}$ in. long, stout, shortly sheathing at the base; leaflets shortly stalked, $1\frac{1}{2}$–3 in. long, elliptic-oblong to ovate-oblong, narrowed to the base, acute at the tip, dull-green, coriaceous, sharply serrate; veins indistinct, but midrib prominent on both surfaces. Umbels terminal or near the tips of the branches, unisexual; primary rays 4–7, radiating, $\frac{3}{4}$ in. long in fruit; secondary 7–12, $\frac{1}{3}$ in. long; pedicels short, slender. Flowers small, but females alone seen, $\frac{1}{5}$ in. long. Ovary 2-celled; styles 2, connate at the base, tips spreading. Fruit orbicular, compressed, $\frac{1}{4}$ in. broad.

South Island: Described from specimens taken from a young tree cultivated in Dr. Hunter's garden at Dunedin, and originally collected by the late Mr. H. J. Matthews in some locality in the south of Westland.

Apparently nearest to *N. Sinclairii*, but differing in the stouter habit, leaves always 3-foliolate and much more coriaceous, and in the much more developed inflorescence. I have pleasure in associating with it the name of Mr. Macintyre, formerly chief gardener to the late Mr. H. J. Matthews, and for many years a most successful cultivator of New Zealand plants.

(Hook. f.) T. 56: 27.

7. **N. Sinclairii** *Seem. in Journ. Bot.* iv (1866) 296.—A branching shrub or small tree 6–15 ft. high. Leaves 3–5-foliolate; petioles 2–3 in. long, slender, not sheathing at the base; leaflets sessile or very shortly stalked, 1–3 in. long, obovate- or oblong-lanceolate, acute or acuminate, dull-green, coriaceous, sharply serrate; veins obscure. Umbels small, unisexual, axillary or terminal, 3–10-flowered or more, on simple or branched peduncles 1–$1\frac{1}{2}$ in. long; pedicels short. Calyx minutely 5-toothed. Ovary 2-celled; styles 2, short, recurved. Fruit orbicular, compressed, 2-celled, $\frac{1}{8}$–$\frac{1}{6}$ in. diam.—Panax Sinclairii *Hook. f. Handb. N.Z. Fl.* (1864) 103; *T. Kirk Students' Fl.* (1899) 219; *Cheesem. Man. N.Z. Fl.* (1906) 230.

North Island: Thames goldfields, near Tairua, *Adams!* Te Aroha, Pirongia, and Karioi Mountains, *T. F. C.;* Opepe, near Taupo, *T. Kirk!* summit of Tauhara Mountain, *H. J. Matthews!* forests near the base of Ruapehu, *T. F. C., Cockayne, E. Phillips Turner!* Mount Egmont, *Buchanan! T. F. C.;* Ruahine Mountains, *Colenso;* East Cape, *Sinclair;* Tararua Mountains, *Petrie.* Altitudinal range 1000–3500 ft. January–February.

Very closely allied to *P. simplex*, from which it is chiefly separated by the leaves being 3–5-foliolate, never 1-foliolate.

(Hook. f.)

8. **N. Colensoi** *Seem. in Journ. Bot.* iv (1866) 296.—A glabrous shrub or small tree 5–15 ft. high; branches stout, spreading. Leaves 3–5-foliolate; petioles 2–9 in. long, with a stout 2-lobed sheathing base; leaflets 2–6 in.,

obovate- or oblong-lanceolate, acute or obtuse, sessile or shortly petioled, coarsely serrate, thick and coriaceous, smooth and glossy, veins usually indistinct. Flowers dioecious. Umbels large, compound, terminal, similar to those of *P. arboreum* but smaller and with fewer primary rays; secondary rays ½–1 in. long, pedicels short. Ovary 2-celled; styles 2, slightly connate at the base, tips spreading, recurved. Fruit orbicular, ⅕ in. diam., much compressed, 2-celled, purplish-black.—Panax Colensoi *Hook. f. Fl. Nov. Zel.* i (1853) 94, t. 21; *Handb. N.Z. Fl.* (1864) 102; *T. Kirk Students' Fl.* (1899) 218; *Cheesem. Man. N.Z. Fl.* (1906) 231.

North and South Islands, Stewart Island: In hilly or mountainous districts from the Little Barrier Island and Cape Colville southwards. Usually from 1500 to 4500 ft., but descending to sea-level on Stewart Island. December–February.

Very closely allied to *P. arboreum*, but the leaves are 3–5-foliolate (not 5–7-foliolate), the leaflets are sessile or nearly so, and the veins are usually indistinct. In most of the northern localities the leaves are predominantly 3–5-foliolate, but to the south of the central volcanic plateau they are mostly 3-foliolate.

9. **N. arboreum** *Seem. in Journ. Bot.* iv (1866) 296.—A small much-branched round-headed tree 12–25 ft. high; branches stout, brittle. Leaves digitately 5–7-foliolate; petioles stout, 2–10 in. long, with a broad 2-lobed sheath at the base; leaflets 3–7 in., on petioles ½–1 in. long, broad- or narrow-oblong or obovate-oblong, obtuse or acute, serrate or sinuate-serrate, coriaceous, smooth, veins distinct. Umbels large, terminal, compound, dioecious; primary rays 8–12, radiating, 2–4 in. long; secondary 10–20, ½–1½ in. long, each bearing a 10–15-flowered umbel; pedicels short, slender. Flowers ¼ in. diam. Ovary 2-celled; styles 2, connate at the base, tips free, recurved. Fruit broader than long, compressed, ¼–⅓ in. diam., purplish-black, 2-celled; seeds 1 in each cell.—Panax arboreum *Forst. f. Prodr.* (1786) n. 398; *A. Rich. Fl. Nouv. Zel.* (1832) 281; *A. Cunn. Precur.* (1839) n. 510; *Raoul Choix* (1846) 46; *Hook. in Lond. Journ. Bot.* ii (1843) 421, t. 11; *Hook. f. Fl. Nov. Zel.* i (1853) 94; *Handb. N.Z. Fl.* (1864) 102; *T. Kirk Students' Fl.* (1899) 219; *Cheesem. Man. N.Z. Fl.* (1906) 231.

Kermadec Islands, North and South Islands: Abundant in lowland districts throughout. Sea-level to 2500 ft. *Whauwhau-paku.* June–July.

10. **N. laetum** *Cheesem. in Trans. N.Z. Inst.* liv (1923) 568.—A small much-branched tree or large round-topped shrub 8–20 ft. high, with much of the habit and appearance of *N. arboreum*. Leaves much larger and more coriaceous, digitately 5–7-foliolate, primary petioles sheathing at the base, stout, dark-purple, 5–8 in. long or more; leaflets 6–12 in. including the petiolule, narrow obovate-oblong, acute or subacute, gradually tapering to the base, petiolules and midribs conspicuously dark purplish-red, dark-green and glossy above, paler beneath, margins surrounded by a faint purplish line, upper ⅔ shallowly sinuate-serrate or dentate, lower ⅓ entire, often unequal at the base. Inflorescence composed of large terminal compound dioecious umbels, very similar to that of *N. arboreum*.—Panax arboreum *var.* laetum *T. Kirk Students' Fl.* (1899) 219; *Cheesem. Man. N.Z. Fl.* (1906) 231.

North Island: Auckland—Hills in the upper valley of the Kauaeranga River, Thames, alt. 1000 ft., *T. Kirk! T. F. C., W. Townson!* Taranaki—Upper Waitotara, *J. R. Annabell!*

This differs altogether from *N. arboreum* in the much larger and more coriaceous leaves, which are often a foot in length and have dark purplish-red petioles and midribs; and, according to Mr. Townson, in the laxly drooping position of the leaves and more finely cut serratures.

3. **MERYTA** Forst. 1776.

Small glabrous trees, more or less resinous. Leaves large, simple, entire or sinuate, extremely coriaceous. Flowers dioecious or polygamo-dioecious, either paniculate or closely compacted in sessile or stalked heads. Male flowers: Calyx-limb obsolete or 3–5-toothed. Petals varying in number from 5–15, but usually about 5, valvate. Stamens 5, alternating with the petals; filaments rather long; anthers ovate-oblong. Female flowers: Calyx-limb obsolete. Petals 4–5, small. Anthers sterile. Ovary ovoid, 3–many-celled; styles thick, distinct, at length recurved. Fruit ovoid or globose; exocarp fleshy; cells 3–8, 1-seeded. Seeds compressed; albumen homogeneous.

With the exception of one species found in Queensland, this is almost purely a Polynesian and Melanesian genus. Its main home appears to be in New Caledonia, from whence no less than 13 species have been described out of the total number of 25. There are 2 or 3 in Tahiti, 1 in Rarotonga, 1 or 2 in the Tongan or Samoan Groups, 2 in Norfolk Island, and 1 from New Zealand.

1. **M. Sinclairii** (Hook. f.) *Seem. in Bonplandia*, x (1862) 295.—A very handsome round-headed small tree 8–25 ft. high; trunk 6–18 in. diam.; branches stout, brittle. Leaves very large, crowded towards the ends of the branches; petiole stout, 4–15 in. long; blade 10–20 in. long or more, oblong-obovate or oblong, obtuse, slightly cordate at the base, very coriaceous, smooth and shining, strongly veined; margins entire, slightly undulate, bordered with a stout vein. Panicles stout, erect, terminal, 6–18 in. long; branches jointed on the rhachis. Male flowers sessile in clusters of 4–8, with a broad bract at the base of each cluster. Calyx-limb obsolete. Petals 4, ovate-oblong. Stamens 4; filaments slender, exserted. Female flowers irregularly crowded, with a bract at the base of each. Calyx as in the males. Petals 4–5, ovate-triangular. Abortive stamens present. Styles 4–5, free to the base. Fruit $\frac{1}{3}$–$\frac{1}{2}$ in. long, broadly oblong, succulent, black and shining, 4–5-celled. Seeds solitary in each cell, compressed, bony.—*Hook. f. Handb. N.Z. Fl.* (1864) 104; *T. Kirk Forest Fl.* (1889) t. 121; *Students' Fl.* (1899) 220; *Cheesem. Man. N.Z. Fl.* (1906) 232; *Ill. N.Z. Fl.* i (1914) t. 73. Botryodendrum Sinclairii *Hook. f. Fl. Nov. Zel.* i (1853) 97.

North Island: Three Kings Islands, abundant, *T. F. C.*; Hen and Chickens (Taranga Islands), *Hutton* and *T. Kirk! Reischek! T. F. C.*, not plentiful. *Puka.* Flowers most of the year.

The specimens on which Sir Joseph Hooker founded the species were obtained from a solitary tree planted by the Maoris at Paparaumu, in Whangaruru Harbour; but it is not known in an indigenous state on any part of the mainland, and must be considered one of the rarest species of the New Zealand flora. The Maoris state that it exists on the Poor Knights Islands, between Whangarei and the Bay of Islands, but I have seen no specimens from thence, and it was not observed by Dr. Cockayne during his visit thereto.

4. **SCHEFFLERA** Forst. 1776.

Glabrous or pilose shrubs or small trees. Leaves digitately or pinnately compound; leaflets serrulate or entire. Stipules usually present. Flowers polygamous or dioecious, usually arranged in a racemose manner on the branches of a spreading panicle, or, in species not found in New Zealand, sessile or stalked in clusters or umbels of various patterns. Calyx-limb minutely 5-toothed or almost obsolete. Petals 5–15, but

generally 5–6, valvate in the bud. Stamens the same number as the petals; anthers ovate or elliptical. Disc large, with undulate margins. Ovary 5–10-celled, seldom more. Styles the same number as the cells, connate below. Fruit subglobose or broadly ovoid, 5–10-celled; exocarp fleshy; seeds 1 in each cell.

As defined in the "Pflanzenfamilien," this is a genus of over 150 species, abundant in the tropics of both hemispheres. The single New Zealand species (which is the type of the genus) is endemic.

1. **S. digitata** *Forst. Char. Gen.* (1776) 46.—A small tree 10–25 ft. high, with stout spreading branches. Leaves on sheathing petioles 4–9 in. long, digitately 7–10-foliolate; leaflets 3–7 in., petiolate, oblong- or obovate-lanceolate, acuminate, thin and membranous, finely and sharply serrate, in young plants often irregularly lobulate or pinnatifid. Panicles axillary or from the branches below the leaves, 8–12 in. long; branches numerous, long, spreading at right angles. Flowers small, greenish, $\frac{1}{4}$–$\frac{1}{3}$ in. diam., in 4–8-flowered umbels arranged in a racemose manner along the branches of the panicle; peduncles $\frac{1}{2}$ in. long; pedicels $\frac{1}{4}$ in. Fruit globose, $\frac{1}{10}$–$\frac{1}{8}$ in. diam., juicy, grooved when dry.—*Hook. f. Handb. N.Z. Fl.* (1864) 103; *T. Kirk Students' Fl.* (1899) 220; *Cheesem. Man. N.Z. Fl.* (1906) 232. S. Cunninghamii *Miq. in Linnaea*, xviii (1844) 89. Aralia Schefflera *Spreng. Pl. Pugill.* i (1813–15) 28; *A. Rich. Fl. Nouv. Zel.* (1832) 283; *A. Cunn. Precur.* (1839) n. 513; *Raoul Choix* (1846) 46; *Hook. f. Fl. Nov. Zel.* i (1853) 95, t. 22.

North and South Islands, Stewart Island: Abundant in woods from the North Cape southwards. Altitudinal range from sea-level to 3000 ft. *Pate; Patete.* February–March.

5. **PSEUDOPANAX** C. Koch. 1859.

Glabrous shrubs or small trees. Leaves extremely variable, simple or digitately compound, those of young plants often widely different from those of mature trees; leaflets coriaceous, entire or more or less toothed or serrate. Flowers dioecious, in racemose or paniculate umbels. Calyx-limb entire or toothed. Petals 5, valvate. Stamens 5; anthers ovate or oblong. Ovary 5-celled; styles the same number, very short, connate into a short cone or column. Fruit fleshy, subglobose, ribbed when dry, 5-celled; seeds 1 in each cell.

As characterized above, the genus contains 8 or 9 species, 2 or 3 of which are found in South America, and the remaining 6 in New Zealand. It is mainly distinguished from *Panax* by the 5-celled ovary and 5 styles, the latter being very short and connate into a minute cone or column. It would form a much more natural group if it were limited to *P. crassifolium*, *P. ferox*, and *P. chathamicum*, together with *Nothopanax lineare*, which in several respects is closely allied to *P. crassifolium*, and which occasionally has a 5-celled ovary.

* Leaves of young plants not markedly different from those of old ones.

Bronzy or yellow-green. Leaves 3–5-foliolate; leaflets sharply toothed, veined	1. *P. discolor.*
Dark-green. Leaves 3–5-foliolate; leaflets entire or sinuate-serrate, veins obscure	2. *P. Lessonii.*
Dark-green. Leaves mostly 1-foliolate, with a few 3-foliolate ones intermixed	3. *P. Gilliesii.*

** Leaves of young plants altogether different from those of old ones.

Leaves of young trees deflexed, with short distant teeth. Fruit small, $\frac{1}{5}$ in. diam. .. .. 4. *P. crassifolium.*

Leaves of young trees deflexed, with broad lobulate hooked teeth. Fruit large, oblong, $\frac{1}{3}$ in. long .. .. 5. *P. ferox.*

Leaves of young trees never deflexed. Fruit large, globose, $\frac{1}{3}$ in. diam. .. .. 6. *P. chathamicum.*

(G.H.) Trans. 3:178.

1. **P. discolor** *Harms in Engl. and Prantl. Pflanzenf.* iii, 8 (1894) 48.—A much-branched shrub 6–15 ft. high. Leaves bronzy or yellow-green, 3–5-foliolate, often with 1-foliolate leaves intermixed; petioles slender, 1–3 in. long; leaflets $1\frac{1}{2}$–3 in., obovate to obovate-lanceolate or elliptic-lanceolate, narrowed at the base, acute or acuminate, glossy and coriaceous, sharply serrate. Umbels terminal; male of 4–10 slender rays 2–3 in. long, bearing numerous racemose flowers on pedicels $\frac{1}{8}$–$\frac{1}{4}$ in. long; female (or hermaphrodite ?) umbels of much shorter rays $\frac{3}{4}$–2 in. long terminating in 2–6-flowered umbellules. Flowers $\frac{1}{6}$ in. diam. Ovary 5-celled; styles 5, connate at the base, very short, tips erect or slightly recurved. Fruit $\frac{1}{4}$ in. long, broadly oblong, 5-celled.—*Cheesem. Man. N.Z. Fl.* (1906) 233; *Ill. N.Z. Fl.* i (1914) t. 74.

North Island: Auckland—Whangaroa North, Great Barrier Island, and Omaha, *T. Kirk!* Little Barrier Island, *T. Kirk, Shakespear! T. F. C.;* Cape Colville Peninsula, in many localities from Moehau, Mount Wynyard, Upper Kauaeranga, to Tairua, *T. Kirk! T. F. C., Adams! W. Townson!* Sea-level to 2800 ft. December–January.

The ovary-cells and styles are very exceptionally less than 5, and the species certainly falls into *Pseudopanax* as that genus is characterized in the "Genera Plantarum." Its nearest ally is *P. Lessonii.* So far as I have been able to ascertain, there is little difference between the foliage of the juvenile and mature plants.

2. **P. Lessonii** *C. Koch in Wochenschrift,* ii (1859) 336.—A glabrous much-branched shrub or small tree 8–20 ft. high; branches robust. Leaves crowded towards the tips of the branches, 3–5-foliolate; petioles stout, 2–6 in. long, scarcely sheathing at the base; leaflets 1–4 in., sessile, narrowed towards the base, obovate- or oblong-lanceolate, obtuse or acute, entire or sinuate-serrate, smooth and shining, very thick and coriaceous, quite glabrous, veins indistinct. Leaves of juvenile plants very similar to those of the mature, but usually 5-foliolate with much larger leaflets (sometimes 4–6 in. long) and with coarser serratures. Umbels terminal, compound; males with 4–8 primary rays 1–6 in. long, each ending in 4–10 secondary rays bearing numerous racemose flowers; females with shorter and fewer rays and less numerous flowers, not so conspicuously racemose. Flowers $\frac{1}{5}$ in. diam. Ovary 5-celled; styles 5, very short, connate at the base, their tips at length recurved. Fruit broadly oblong, $\frac{1}{4}$ in. long, 5-celled.—*T. Kirk Students' Fl.* (1899) 221; *Cheesem. Man. N.Z. Fl.* (1906) 234. Panax Lessonii *DC. Prodr.* iv (1830) 253; *Hook. f. Handb. N.Z. Fl.* (1864) 102. Cussonia Lessonii *A. Rich. Fl. Nouv. Zel.* (1832) 285, t. 32; *A. Cunn. Precur.* (1839) n. 511; *Raoul Choix* (1846) 46. Hedera Lessonii *A. Gray Bot. U.S. Expl. Exped.* (1854) 719. T, 56:85.

North Island: From the Three Kings Islands and the North Cape to Poverty Bay, usually near the coast. *Houmāpara; Houpara.* January–February.

3. **P. Gilliesii** *T. Kirk Students' Fl.* (1899) 221.—A shrub or small tree 10–15 ft. high; branches slender. Leaves mostly 1-foliolate, mixed with a few 3-foliolate ones; petiole slender, $\frac{1}{2}$–$1\frac{1}{2}$ in. long; blade $1\frac{1}{2}$–$2\frac{1}{2}$ in.,

variable in shape, ovate to ovate-lanceolate or lanceolate, acute or acuminate, coarsely sinuate-toothed, rather coriaceous. Flowers long past in all the specimens seen, but apparently arranged in a racemose manner on numerous terminal peduncles 2–4 in. long; pedicels ½–1 in. Fruit ¼ in. long, broadly oblong, 5-celled; styles 5, very short, connate, free at the very tip.—*Cheesem. Man. N.Z. Fl.* (1906) 234. Panax Lessonii *var.* heterophylla *T. Kirk in Trans. N.Z. Inst.* x (1878) App. xxxv.

North Island: Auckland—Whangaroa North, in forest and along the coast, rare, *Buchanan! Gillies* and *T. Kirk!* Little Barrier Island, *T. F. C.*

A very curious plant, no doubt closely allied to *P. Lessonii*, but differing in the heterophyllous foliage of the mature tree, and the shape of the simple leaves. The foliage of the juvenile plant is unknown.

(Sol. ex. A. Cunn.)

4. **P. crassifolium**/*C. Koch in Wochenschrift*, ii (1859) 336.—A small round-headed tree 20–50 ft. high; trunk naked below, 9–18 in. diam. Leaves excessively variable, differing greatly at various stages of growth, the following being the chief forms: (1) of seedlings, rhomboid to ovate-lanceolate, cuneate at the base, coarsely toothed or lobed, membranous; (2) of young unbranched plants, deflexed, very narrow-linear, 6–36 in. long, ¼–½ in. wide, remotely and acutely toothed, excessively rigid and coriaceous, dull-green above, often purplish below; (3) in a more advanced stage, during which the stem commences to branch and flowers may appear, the leaves are erect or spreading, and may be either (*a*) 1-foliolate, 6–12 in. long, ½–1½ in. wide, linear or linear-obovate, coarsely and acutely toothed, very coriaceous; or (*b*) 3–5-foliolate with sessile leaflets 6–12 in. long by ½–¾ in. wide, coarsely and remotely toothed; (4) in the mature stage the leaves are 1-foliolate, 3–8 in. long, 1–1½ in. wide, linear to linear-oblong or linear-obovate, obtuse or subacute, narrowed into stout petioles ½–1 in. long, entire, sinuate-serrate or coarsely toothed at the tip. Umbels terminal, compound; primary rays 4–10, 2–3 in. long; secondary 4–10, ½–1 in. long; flowers racemose or umbelled; pedicels short. Ovary 5-celled or rarely 4-celled by abortion; styles the same number as the cells, connate into a cone. Fruit globose, ⅕ in. diam.—*T. Kirk Forest Fl.* (1889) tt. 38, 38A, 38B, 38C, 38D; *Students' Fl.* (1899) 222; *Cheesem. Man. N.Z. Fl.* (1906) 235. Aralia crassifolia *Soland. ex A. Cunn. Precur.* (1839) n. 514; *Hook. Ic. Plant.* (1843) tt. 583, 584; *Raoul Choix* (1846) 46; *Hook. f. Fl. Nov. Zel.* i (1853) 96. Panax crassifolium *Dcne. and Planch. in Rev. Hort.* (1854) 105; *Hook. f. Handb. N.Z. Fl.* (1864) 101; *T. Kirk in Trans. N.Z. Inst.* x (1878) App. xxxiii. P. longissimum *Hook. f. l.c.* 102. P. coriaceum *Regel in Gartenfl.* (1859) 45. Hedera crassifolia *A. Gray Bot. U.S. Expl. Exped.* (1854) 719.

Var. **unifoliolatum** *T. Kirk Forest Fl.* (1889) 61.—Leaves of the third stage 1-foliolate.

Var. **trifoliolatum** *T. Kirk l.c.*—Leaves of the third stage (when present) 3–5-foliolate.

North and South Islands, Stewart Island: Var. *unifoliolatum* abundant in woods from the south of the Auckland Provincial District to Stewart Island; var. *trifoliolatum* from the North Cape to Hawke's Bay and Taranaki. Sea-level to 2500 ft. *Horoeka: Hohoeka; Lancewood.* February–April.

Remarkable for its singularly protean foliage. For a detailed account, reference should be made to Kirk's "Forest Flora," pp. 59 to 62, which is still the best account published, although deficient in several respects. For instance, he evidently supposes

that his variety *trifoliolatum* always passes through a trifoliolate stage, whereas in some districts it is difficult to find any specimens in that stage, and quite easy to prove that many individuals assume the mature foliage without producing any compound leaves.

5. **P. ferox** *T. Kirk Forest Fl.* (1889) 35, tt. 23, 24, 25, 26.—A small slender tree 12–20 ft. high; trunk 6–12 in. diam. Leaves very variable, but always simple; of seedlings narrow linear-lanceolate; of young unbranched plants deflexed, 12–18 in. long, ½–1 in. wide, narrow-linear, slightly enlarged at the tip, gradually narrowed into a short stout petiole, excessively thick and coriaceous, rigid, coarsely and irregularly lobulate-dentate; teeth large, acute, hooked, almost spinous. Leaves of mature plants erect, 3–6 in. long, ¼–¾ in. broad, linear-obovate, obtuse or apiculate, gradually narrowed into a short stout petiole, very thick and coriaceous, entire or obscurely toothed near the tip. Umbels terminal; males of 6–10 slender rays bearing numerous racemose flowers; females of much shorter rays ending in 2–4-flowered umbellules. Stamens usually 4. Ovary 5-celled; styles 5, connate into a column. Fruit broadly oblong, large, ⅓ in. diam. —*Students' Fl.* (1899) 222; *Cheesem. Man. N.Z. Fl.* (1906) 235. Panax ferox *T. Kirk in Trans. N.Z. Inst.* x (1878) App. xxxiv. P. crassifolium *Buch. in Trans. N.Z. Inst.* ix (1877) 529, t. 20 (*not of Dcne. and Planch.*).

North Island: Auckland—Reef Point, near Ahipara, *R. H. Matthews! H. Carse!* between Whangape and Hokianga, *T. Kirk;* East Cape, *Bishop Williams.* South Island: Nelson—Wairoa, *Hector* and *T. Kirk! F. G. Gibbs!* Moutere and Matukituki, *T. Kirk!* Motueka Valley and Graham River, *T. F. C.* Canterbury—Lake Forsyth, *T. Kirk!* Raincliffe Reserve, *Cockayne.* Otago—Vicinity of Dunedin, *Buchanan! Petrie, H. J. Matthews!* Otepopo and Lake Wakatipu, *Petrie!* Croydon Bush, near Gore, *Poppelwell, Speden!* Green Island, Taieri Gorge, Clifden, *B. C. Aston;* Lake Wanaka, *Cockayne.* Sea-level to 2000 ft.

Easily distinguished from *P. crassifolium* by the large and broad-hooked teeth of the deflexed leaves, by the slender racemes of the male flowers, and by the large fruit. Although its area of distribution stretches over the greater part of the Dominion, it is singularly rare, and is seldom found in any quantity.

6. **P. chathamicum** *T. Kirk Students' Fl.* (1899) 223.—A small tree 20–25 ft. high; branches stout. Leaves dimorphic, always simple; of young unbranched plants never deflexed, 2–6 in. long, ¾–1¼ in. broad, lanceolate to oblong-lanceolate, acute, coarsely or finely toothed towards the tip, membranous or slightly coriaceous; of mature plants 5–8 in. long, linear-obovate or oblanceolate, subacute obtuse or truncate at the apex, gradually narrowed into a short winged petiole, obscurely sinuate-dentate or with 2–3 coarse teeth near the apex. Umbels terminal: male very large, of 6–10 primary rays, each with 5–8 slender secondary ones 2–3 in. long, carrying crowded racemose flowers often mixed with small umbellules: female umbels smaller; rays 3–7, slender, 2–4 in. long, terminating in 6–10-flowered umbellules, with or without a few scattered flowers below. Stamens usually 4. Ovary 5-celled; styles 5, connate into a short truncate column. Fruit nearly globose, large, ⅓ in. diam., 5-celled, 5-seeded.—*Cheesem. Man. N.Z. Fl.* (1906) 236; *Ill. N.Z. Fl.* i (1914) t. 75.

Chatham Islands: Abundant in woods throughout the islands, *J. D. Enys! F. A. D. Cox! Cockayne. Hoho.* February.

The absence of linear deflexed leaves in the young stage, the larger and broader leaves of the mature plant, and the large globose fruit at once separate it from *P. crassifolium* and *P. ferox.*

Family LXXVII. **UMBELLIFERAE.**

Herbs, very rarely climbing or shrubby, often aromatic when bruised. Stems often grooved or channelled, solid or hollow. Leaves alternate, usually much cut and divided but sometimes simple and entire; petiole dilated and sheathing at the base; stipules wanting (except in *Hydrocotyle*). Flowers small, hermaphrodite or occasionally polygamous, in terminal or lateral umbels which are either simple or compound. Umbels usually furnished at the base with a ring of bracts, those below the primary (or general) umbel forming the involucre, those below the secondary (or partial) ones constituting the involucel. Calyx adnate to the ovary, limb either obsolete or 5-toothed. Petals 5, inserted at the margin of an epigynous disc, the outer often larger, imbricate or valvate, usually inflexed at the tip. Stamens 5, epigynous; filaments curved inwards. Disc epigynous, often 2-lobed and confluent with the base of the styles. Ovary inferior, 2-celled; styles 2, distinct; ovules 1 in each cell, pendulous. Fruit of 2 dry indehiscent carpels cohering by their inner faces (*commissure*), when ripe separating from a filiform central axis (*carpophore*), from the top of which they often remain suspended for a time. Each carpel (*mericarp*) generally bears 5 longitudinal ridges, sometimes expanded into wings. In the spaces or furrows between the ridges, and imbedded in the pericarp, are one or more longitudinal oil-canals (*vittae*). Secondary ridges are also sometimes placed between the primary ones. Seeds 1 to each carpel, pendulous; albumen abundant, horny; embryo minute, next the hilum, radicle superior.

A very large and extremely distinct family represented all over the world, but most plentiful in western Asia, south Europe, and north Africa; rarer in the tropics and in the South Temperate Zone. Genera about 200; species estimated at 2600. The properties of the family are extremely varied. Several species secrete a poisonous and narcotic acrid sap, as hemlock, fool's parsley, water drop-wort, &c. Others are characterized by the presence of a gum-resin, as *Asafoetida* and *Galbanum*. Many species produce aromatic and carminative fruits, as caraway, coriander, dill, &c. The chief edible species are the carrot and parsnip, where the roots alone are eaten; and celery, parsley, and fennel, where the leaves and stems are employed. Of the 14 New Zealand genera, *Coxella* is endemic; *Aciphylla*, *Actinotus*, and probably *Anisotome* extend to Australia; *Azorella*, *Schizeilema*, and *Oreomyrrhis* are mainly South American; but the two latter occur in Australia as well. The remaining 7 are all widely distributed.

* Umbels simple (sometimes irregularly compound in *Schizeilema*).

a. Vittae absent.

Creeping herbs with scarious stipules. Involucre wanting. Fruit laterally much compressed, without secondary ribs or reticulations	1. HYDROCOTYLE.
Creeping herb. Involucre present. Fruit laterally much compressed; secondary ribs or reticulations present	2. CENTELLA.
Stems closely compacted, forming rounded pulvinate masses. Leaves densely imbricated. Fruit tetragonous	3. AZORELLA.
Stems tufted, usually emitting creeping stolons or leafy flowering branches. Fruit tetragonus	4. SCHIZEILEMA.
Leaves and involucres spinous. Umbels contracted into a compact spike or head	5. ERYNGIUM.
Tufted or creeping. Ovary 1-celled, 1-ovuled. Carpel solitary	6. ACTINOTUS.

b. Vittae present.

Tufted or diffuse. Leaves much dissected. Fruit narrowed above, nearly terete	7. OREOMYRRHIS.
Aquatic. Stem creeping. Leaves terete or subcompressed, fistular, septate	8. CRANTZIA.

** Umbels regularly compound. Vittae present (obscure in some). Primary ridges of the fruit alone conspicuous.

Littoral. Stems decumbent. Involucre wanting. Carpels nearly terete .. .. 9. APIUM.

Leaf-segments ending in acicular or spinous points. Umbels in erect spikes or panicles; bracts spinous .. .. .. 10. ACIPHYLLA.

Leaves pinnately decompound, not spinous. Umbels axillary; bracts lanceolate. Fruit oblong, flattened, conspicuously winged; one carpel usually 3-winged, the other 2-winged .. 11. COXELLA.

Leaves pinnate or decompound. Umbels terminal. Carpels with 3–5 narrow subequal wings .. .. 12. ANISOTOME.

Leaves pinnate or 1–3-foliolate in the N.Z. species. Carpels with 2 broad lateral wings .. .. 13. ANGELICA.

*** Umbels regularly compound. Secondary ridges of the fruit prominent, covered with bristles .. .. .. 14. DAUCUS.

1. **HYDROCOTYLE** Linn.

Prostrate herbs, usually growing in moist places or near water. Stems long, slender, rooting at the nodes, often matted. Leaves orbicular or reniform, deeply cordate or peltate, palmately toothed or lobed or divided, rarely entire, long-petioled; stipules small, scarious. Umbels simple, small; involucral leaves usually inconspicuous or wanting. Flowers small, sometimes unisexual. Calyx-teeth minute or obsolete. Petals entire, valvate or imbricate. Fruit strongly laterally compressed, more or less orbicular in outline; commissure very narrow; carpels flat, placed edge to edge, with one or more prominent ribs on each face, but no secondary ribs or reticulations; vittae wanting. Seed straight, laterally compressed.

A genus of about 75 species, spread over the warm and temperate regions of the world, but most numerous in the Southern Hemisphere. Of the 8 New Zealand species, 1 is found in North and South America, and 2 occur in Australia, the remainder appear to be endemic.

Leaves deeply 3–7-lobed. Peduncles exceeding the leaves. Fruits on long slender pedicels .. .. 1. *H. elongata.*

Leaves 3–5-foliolate; leaflets cuneate. Peduncles shorter than the leaves. Umbels 2–6-flowered .. .. .. 2. *H. tripartita.*

Leaves 3–7-lobed almost to the base. Umbels 20–40-flowered; peduncles longer or shorter than the leaves .. .. 3. *H. dissecta.*

Leaves thin, with 5–7 shallow lobes. Umbels 3–7-flowered, sessile or on very short peduncles (sometimes $\frac{1}{2}$ as long as the petioles in var. *heteromeria*) .. .. 4. *H. americana.*

Glabrous or nearly so. Leaves obscurly 3–7-lobed. Umbels 3–8-flowered. Carpels large, flat, with a broad dorsal wing .. 5. *H. pterocarpa.*

Pilose or nearly glabrous. Leaves obscurely 3–7-lobed. Umbels 5–12-flowered. Carpels rounded on the dorsal edge .. .. 6. *H. novae-zealandiae.*

Hispidly pilose. Leaves sharply 5–7-lobed. Umbels 10–20-flowered. Carpels acute on the dorsal edge .. .. 7. *H. moschata.*

Small, glabrous or nearly so. Leaves $\frac{1}{10}$–$\frac{1}{3}$ in., 5–7-lobed. Umbels 2–6-flowered. Carpels rounded on the dorsal edge .. .. 8. *H. microphylla.*

1. **H. elongata** *A. Cunn. Precur.* (1838) n. 495.—More or less softly pilose, rarely almost glabrous. Stems 4–12 in. long, very slender, branched, creeping and rooting at the nodes. Leaves $\frac{1}{2}$–1 in. diam., orbicular-reniform, deeply 3–7-lobed; lobes rounded, acutely toothed; petioles slender, 1–3 in. long or more; stipules small. Peduncles very slender, exceeding the leaves; umbels 10–30-flowered. Flowers minute, on slender pedicels. Fruit small, brownish, $\frac{1}{12}$ in. diam., more or less pubescent or bristly; carpels with one rib on each face.—*Raoul Choix* (1846) 46;

Hook. f. Fl. Nov. Zel. i (1853) 84; *Handb. N.Z. Fl.* (1864) 85; *T. Kirk Students' Fl.* (1899) 187; *Cheesem. Man. N.Z. Fl.* (1906) 195; *Ill. N.Z. Fl.* i (1914) t. 58. H. echinella *Col. in Trans. N.Z. Inst.* xx (1888) 191. H. concinna *Col. l.c.* xvii (1885) 239.

North and South Islands: Not uncommon in moist shady woods from the North Cape southwards. Sea-level to 2500 ft. November–March.

A very distinct plant, easily recognized by the large size, softly pilose habit, deeply lobed leaves, long peduncles, and pedicelled flowers.

2. **H. tripartita** *R. Br. ex A. Rich. in Ann. Sc. Phys.* iv (1820) 209, t. 61, f. 25.—Usually densely matted, dark-green, smooth and shining, glabrous or nearly so. Stems branched, filiform, creeping and rooting at the nodes, 1–4 in. long. Leaves coriaceous or fleshy, $\frac{1}{4}$–$\frac{1}{2}$ in. diam., 3–5-partite to the base; leaflets cuneate, 2–3-toothed or -lobed at the tip or quite entire; petioles $\frac{1}{2}$–2 in. long; stipules rather large, entire. Peduncles slender, shorter than the leaves; umbels 2–6-flowered. Flowers small, shortly pedicelled or sessile. Fruit small, rather turgid, brownish, glabrous. Carpels rounded at the back, convex on the sides, with one obscure rib on each face.—*Hook. f. Fl. Nov. Zel.* i (1853) 83; *Benth. Fl. Austral.* iii (1866) 341; *T. Kirk Students' Fl.* (1899) 188; *Cheesem. Man. N.Z. Fl.* (1906) 196. H. muscosa *R. Br. ex A. Rich. Ann. Sc. Phys.* iv (1820) 208, t. 61, f. 27; *Hook. f. Handb. N.Z. Fl.* (1864) 86.

Var. **hydrophila.**—Much smaller and more delicate; stems $\frac{1}{2}$–1 in. long. Leaves $\frac{1}{6}$–$\frac{1}{5}$ in. diam.; leaflets minute, entire or with 2–3 shallow crenatures. Umbels 1–2-flowered. Fruit much smaller, but otherwise as in the type.—H. hydrophila *Petrie in Trans. N.Z. Inst.* xxix (1897) 425.

North Island: Hawke's Bay and Tongariro, *Colenso!* Var. *hydrophila:* Lower Waikato River, *H. Carse!* Matata (Bay of Plenty), *Petrie!* Ruahine Mountains, *B. C. Aston.* South Island, Stewart Island: Not uncommon in marshy places. Var. *hydrophila:* Otago—Tomahawk Lagoon, *Petrie!* Wickliffe Bay, Bluff, *B. C. Aston!* Sea-level to 4000 ft.

The trifoliolate leaves at once separate this from all the other New Zealand species. Mr. Petrie's *H. hydrophila* has no distinguishing characters apart from its much smaller size. The typical form is also found in Australia and Tasmania.

3. **H. dissecta** *Hook. f. Fl. Nov. Zel.* i (1853) 84.—Small, slender, matted, more or less hispid-pilose. Stems much branched, creeping and rooting, 3–9 in. long. Leaves alternate or in alternate fascicles, $\frac{1}{3}$–1 in. diam., orbicular or orbicular-reniform, 3–7-lobed almost to the base; lobes obovate-cuneate, acutely toothed or almost laciniate, hairy on both surfaces; petiole $\frac{1}{2}$–$1\frac{1}{2}$ in. long. Peduncles variable in length, $\frac{1}{2}$–2 in. long, longer or shorter than the leaves; umbels 20–40-flowered. Flowers small, sessile. Fruit densely crowded, small, red-brown, glabrous; carpels somewhat turgid, with one obtuse rib on each face; margins acute.—*Handb. N.Z. Fl.* (1864) 86; *T. Kirk Students' Fl.* (1899) 188; *Cheesem. Man. N.Z. Fl.* (1906) 196.

North Island: Near Maunganui Bluff, *Petrie!* Northern Wairoa, *T. F. C.;* Whangarei, *H. Carse! Petrie! T. F. C.;* Matakana, *T. Kirk!* Hunua, *T. Kirk! T. F. C.;* Lower Waikato, *H. Carse!* Hawke's Bay, *Colenso.* South Island: Marlborough, *J. H. Macmahon!* Motupiko, Nelson, *H. H. Allan;* near Westport, *W. Townson!* Otira Valley and Catlin's River, *Petrie!* Sea-level to 1200 ft. November–February.

A well-marked plant, perhaps more closely allied to *H. moschata* than to any other, but differing widely in the deeply and sharply lobed leaves. Mr. Carse sends a form with proliferous umbels.

Aua te Whenua · 3/5/31 M.H.

4. **H. americana** *Linn. Sp. Plant.* (1753) 234.—Small, very slender, matted, pale-green and glistening, glabrous or with a few loose hairs on the petioles. Stems 3–6 in. long, filiform, much branched. Leaves very delicate and membranous, $\frac{1}{4}$–$\frac{3}{4}$ in. diam., orbicular-reniform, 5–7-lobed; lobes shallow, crenate; petioles $\frac{1}{2}$–$1\frac{1}{2}$ in. long; stipules small. Umbels small, 3–6-flowered, sessile in the axils of the leaves or very shortly peduncled. Flowers sessile or nearly so. Fruit minute, pale yellowish-brown, glabrous, or one or both carpels more or less hispid; carpels with one rib on each face, margins acute.—*Hook. f. Fl. Nov. Zel.* i (1853) 82; *Handb. N.Z. Fl.* (1864) 85; *T. Kirk Students' Fl.* (1899) 187; *Cheesem. Man. N.Z. Fl.* (1906) 196.

Var. **heteromeria** *T. Kirk l.c.* 188.—Rather larger. Leaves $\frac{1}{2}$–1 in. diam.; petioles often 2 in. long. Umbels usually shortly peduncled; peduncled sometimes $\frac{1}{2}$ the length of the petioles. Fruit as in the type.—H. heteromeria *A. Rich. in Ann. Sc. Phys.* iv (1820) 200; *A. Cunn. Precur.* (1838) n. 499; *Hook. f. Fl. Nov. Zel.* i (1853) 82; *Handb. N.Z. Fl.* (1864) 86. H. nitens *Col. in Trans. N.Z. Inst.* xxiii (1891) 386.

North and South Islands, Stewart Island: Not uncommon from the North Cape southwards. Sea-level to 2000 ft. October–February. The typical form is also found in North and South America.

5. **H. pterocarpa** *F. Muell. in Trans. Vict. Inst.* i (1855) 126.—Smooth, often shining, perfectly glabrous or sparingly pilose. Stems slender, 6–14 in. long, branched, creeping and rooting. Leaves $\frac{1}{2}$–1 in. diam., orbicular-reniform with a narrow or closed sinus, very thin and membranous, obscurely 3–7-lobed; lobes crenate; petioles slender, 1–4 in. long. Peduncles rather slender, shorter than the leaves; umbels 3–8-flowered. Flowers shortly pedicelled or almost sessile. Fruit large, flat, broader than long, notched above and below, often mottled; carpels with one rib on each face, and with the dorsal edge expanded into a broad wing.—*Hook. f. Fl. Tasm.* i (1860) 153, t. 33; *Handb. N.Z. Fl.* (1864) 86; *T. Kirk Students' Fl.* (1899) 188; *Cheesem. Man. N.Z. Fl.* (1906) 196.

North and South Islands: In lowland swamps from Mangonui to North Canterbury, but often local. December–February. Also in Victoria and Tasmania.

6. **H. novae-zealandiae** *DC. Prodr.* iv (1830) 67.—Very variable in size and habit of growth. Stems 3–12 in. long, much or sparingly branched, open or matted, creeping and rooting at the nodes, sometimes ascending at the tips, pilose or almost glabrous. Leaves $\frac{1}{4}$–$1\frac{1}{4}$ in. diam., orbicular-reniform with usually an open sinus, obscurely 5–9-lobed or -angled; lobes shallow, obscurely and obtusely crenate, rarely more acutely toothed, usually membranous but sometimes subcoriaceous, sparingly hairy or nearly glabrous; petioles $\frac{1}{2}$–3 in. long, slender, usually pilose with reversed hairs above. Peduncles shorter than the leaves; umbels 5–12-flowered. Flowers shortly pedicelled. Fruit $\frac{1}{12}$ in. diam., broader than long, somewhat flattened, glabrous, pale-brown, sometimes mottled; carpels rounded at the back, with an indistinct rib or groove on each face.—*A. Cunn. Precur.* (1838) n. 497; *Raoul Choix* (1846) 46; *Hook. f. Fl. Nov. Zel.* i (1863) 83; *Handb. N.Z. Fl.* (1864) 86; *T. Kirk Students' Fl.* (1899) 189; *Cheesem. Man. N.Z. Fl.* (1906) 197. H. dichondraefolia *A. Cunn. l.c.* n. 498. H. intermixta *Col. in Trans. N.Z. Inst.* xvii (1885) 240. H. alsophila *Col. l.c.* xviii (1886) 261. H. involucrata *Col. l.c.* xix (1887) 262. H. amoena *l.c.* xxi (1889) 83.

Var. **robusta.**—Stems stout, suberect above. Fruit large, $\frac{1}{8}$ in. broad, turgid; carpels with a groove on each face.—H. robusta *T. Kirk Students' Fl.* (1899) 189.

Var. **montana** *T. Kirk l.c.*—Stems stout, creeping, densely matted. Leaves usually with a narrow sinus, coriaceous, glabrous or nearly so, lobes shallow. Carpels with a groove on each face.

North and South Islands, Stewart Island: Abundant throughout, var. *montana* ascending to quite 4000 ft. Var. *robusta:* Sandy beaches north of Auckland, rare. November–March.

A very variable plant, but one that can generally be recognized without much difficulty by the shallow and rounded lobes of the leaves, and by the compressed fruits with thick obtuse margins. I am unable to maintain Mr. Kirk's *H. robusta* as a separate species, the differences between it and the typical state being of a very trivial character. Closely allied to it is a large-leaved species gathered by Dr. Cockayne in forests in the Chatham Islands, in which the leaves are sometimes 2 in. diam.

7. **H. moschata** *Forst. f. Prodr.* (1786) n. 135.—More or less hispid or pilose, rarely almost glabrous. Stems 2–12 in. long, much branched, often densely matted, creeping and rooting at the nodes. Leaves $\frac{1}{6}$–1 in. diam., reniform or orbicular with usually an open sinus, distinctly 5–7-lobed; lobes sharply toothed, usually hispid on both surfaces but sometimes glabrescent, firm or almost coriaceous; petioles rather stout, $\frac{1}{6}$–2 in. long, usually pilose above with reversed hairs. Peduncles longer or shorter than the leaves; umbels 5–40-flowered. Flowers sessile or nearly so. Fruits usually densely crowded, minute, $\frac{1}{20}$–$\frac{1}{15}$ in. diam., red-brown; carpels acute at the back, with an acute keel or ridge on each face.—*A. Cunn. Precur.* (1838) n. 501; *Raoul Choix* (1846) 46; *Hook. f. Fl. Nov. Zel.* i (1853) 83; *Handb. N.Z. Fl.* (1864) 87; *T. Kirk Students' Fl.* (1899) 189; *Cheesem. Man. N.Z. Fl.* (1906) 197. H. sibthorpioides *Col. in Trans. N.Z. Inst.* xxi (1889) 83.

var. *parvifolia* Cheesem. T.N.Z.I. 59: 315.

Kermadec Islands, North and South Islands, Chatham Islands: Abundant throughout, ascending to 2000 ft. November–March.

Closely allied to *H. novae-zealandiae*, but separated by the distinctly lobed leaves, by the lobes being acutely toothed, and by the much smaller crowded fruits, which are sharply keeled on the back.

8. **H. microphylla** *A. Cunn. Precur.* (1838) n. 496.—Glabrous or with a few loose hairs on the petioles and peduncles. Stems 1–3 in. long, slender or rather stout at the base, creeping and rooting, often matted. Leaves $\frac{1}{10}$–$\frac{1}{3}$ in. diam., orbicular-reniform with usually a closed or narrow sinus, 5–7-lobed; lobes shallow, rounded, obtusely crenate; petiole $\frac{1}{5}$–$\frac{1}{2}$ in. long; stipules rather large for the size of the plant. Peduncles variable in length, longer or shorter than the leaves; umbels 2–6-flowered. Flowers sessile or nearly so. Fruit minute, glabrous, $\frac{1}{20}$–$\frac{1}{15}$ in. diam.; carpels rounded at the back, with an obscure rib or groove on each face.—*Hook. f. Fl. Nov. Zel.* i (1853) 84; *Handb. N.Z. Fl.* (1864) 87; *T. Kirk Students' Fl.* (1899) 190; *Cheesem. Man. N.Z. Fl.* (1906) 198.

North and South Islands, Stewart Island: From Mangonui southwards, but apparently local. December–February.

Cunningham's original description is not at all good, and without access to his specimens I cannot be certain that the plant described above is the same as his. It differs from *H. novae-zealandiae* in the smaller size, glabrous and more deeply divided leaves, few-flowered umbels, and smaller fruit. From *H. moschata* it is at once removed by the round-edged carpels.

2. **CENTELLA** Linn.

Perennial herbs, usually growing in moist shaded places. Stems long, slender, creeping and rooting at the nodes. Leaves reniform or ovate-cordate. Flowers small, whitish, in simple umbels. Calyx-teeth obsolete. Petals entire, imbricate. Involucral bracts conspicuous. Fruit laterally compressed, orbicular in outline; commissure narrow. Carpels flat, each with five primary ribs and with prominent secondary ribs and reticulations; the dorsal marginal and filiform.

A small genus of about 20 species, found in both hemispheres. It is closely allied to *Hydrocotyle*, but appears to be sufficiently distinct in possessing conspicuous involucral leaves, and in the carpels being furnished with secondary ribs and prominent reticulations.

1. **C. asiatica** *Urban in Mart. Fl. Bras.* xi, 1 (1879) 287. — Very variable in size. Stems rather stout, much branched, creeping and rooting at the nodes. Leaves fascicled at the nodes, $\frac{1}{4}$–1 in. diam., orbicular or oblong-reniform, cordate or almost truncate at the base, sinuate-toothed or nearly entire, glabrous or slightly pubescent; petioles very variable in length, $\frac{1}{2}$–6 in. or more, often laxly pubescent above. Peduncles short, $\frac{1}{4}$–1 in. long, rarely more; umbels 2–4-flowered; bracts 2–3, broad, ovate. Fruit $\frac{1}{8}$–$\frac{1}{6}$ in. diam.; carpels with about 3 stout ribs on each face, but often showing the secondary ribs when young, somewhat reticulated, margins obtuse.— Hydrocotyle asiatica *Linn. Sp. Plant.* (1753) 234; *A. Cunn. Precur.* (1838) n. 502; *Raoul Choix* (1846) 46; *Hook. f. Fl. Nov. Zel.* i (1853) 82; *Handb. N.Z. Fl.* (1864) 86; *Benth. Fl. Austral.* iii (1866) 346; *T. Kirk Students' Fl.* (1899) 190; *Cheesem. Man. N.Z. Fl.* (1906) 198. H. cordifolia *Hook. Ic. Plant.* iv (1841) t. 303. H. uniflora *Col. in Trans. N.Z. Inst.* xvii (1885) 239.

North and South Islands, Stewart Island, Chatham Islands: Abundant in moist places from the Three Kings Islands and the North Cape southwards, ascending to 2500 ft. October–March. Also in most tropical and subtropical countries.

3. **AZORELLA** Lam.

Densely tufted herbs, often forming pulvinate masses of considerable size composed of compacted branches covered with the imbricated remains of old leaves. Leaves entire or toothed or ternately or palmately dissected. Peduncles shorter than the leaves or scarcely longer. Umbels few- or many-flowered; involucral bracts free or shortly connate at the base. Calyx-teeth prominent; either small and acute or petal-like and deciduous. Disc thick and fleshy, often confluent with the base of the styles. Carpels subterete or slightly dorsally compressed, 5-ribbed, the lateral ones not close to the commissure.

A species of about 50 or 60 species, chiefly found in Andine and Antarctic South America. The single species found in the New Zealand area has a wide distribution as an Antarctic circumpolar plant.

1. **A. Selago** *Hook. f. Fl. Antarct.* ii (1847) 284, t. 99. — Stems densely tufted, branched, forming large globular masses 1–4 ft. diam. or more, quite glabrous. Leaves alternate, imbricate, $\frac{1}{5}$–$\frac{1}{3}$ in. long; petiole $\frac{1}{2}$ the length, very broad, membranous, closely sheathing the stem; blade much dilated, broader than long, closely appressed, concave, coriaceous, 3–5-partite to the middle, upper surface furnished with several long stiff bristles; lobes spreading, oblong, acute or apiculate; margins quite

entire, much thickened. Umbels almost concealed amongst the uppermost leaves, shortly pedunculate, 3-flowered. Involucral leaves linear, subacute. Calyx-teeth acute. Fruits ovoid, terminated by the elongated styles; carpels slightly compressed, convex on the back, 5-ribbed, contracted at the commissure.—*Phil. Trans. Roy. Soc.* clxviii (1879) 20; *T. Kirk Students' Fl.* (1899) 191; *Cheesem. Man. N.Z. Fl.* (1906) 200; *Subantarct. Is. of N.Z.* ii (1909) 407; *Rep. Macquarie Is.* (1919) 26.

MACQUARIE ISLAND: Sides of the hills, forming prominent globular masses often 4 ft. in diameter, *Fraser, J. H. Scott! A. Hamilton! H. Hamilton!*

Forms large convex masses composed of the closely packed stems and branches of the plant; the young shoots, with their leaves, forming a bright-green smooth and even crust or surface, so densely compacted as to bear the weight of a man. It is also found in Fuegia; Kerguelen Island; Crozets; Marion Island; Heard Island.

4. **SCHIZEILEMA** Domin.

Glabrous perennial herbs; rhizome stout or slender, putting out creeping and rooting stolons. Leaves reniform or orbicular, undivided or crenate-lobed or 3–5-foliolate; petioles always long. Umbels few- or many-

† Leaflets distinctly stalked.

Slender, creeping. Leaves membranous, 3-foliolate .. .. 1. *S. trifoliolatum.*

†† Leaflets or segments all sessile.

Small, densely matted; leaves 3-partite, segments entire or nearly so .. .. 2. *S. nitens.*
Small, coriaceous, leaflets bluntly lobed or crenate. Fruit longer than its pedicel .. .. 3. *S. hydrocotyloides.*
Larger, less coriaceous, leaflets obcuneate, 3–5-lobed. Fruit 3 or 4 times shorter than its pedicel .. .. .. 4. *S. Allanii.*
Large, robust, coriaceous. Fruit usually shorter than its pedicel 5. *S. Roughii.*
Slender, densely matted. Leaves membranous, 3-foliolate. Fruit shorter than its pedicel, involucral leaves obtuse .. .. 6. *S. pallidum.*
Small, leaves few, coriaceous, 3-foliolate. Involucral leaves acuminate .. .. 7. *S. Colensoi.*

** Leaves undivided.

† Minute, leaves entire or nearly so, $\frac{1}{10}$–$\frac{1}{4}$ in. diam.

Small creeping herb. Leaves entire; margins flat .. .. 8. *S. Cockaynei.*
Small tufted herb. Leaves obscurely 3-lobed or crenate; margins recurved .. .. 9. *S. exiguum.*

†† Much longer. Leaves reniform or orbicular-cordate, crenate-lobed.

Leaves $\frac{1}{3}$–$\frac{3}{4}$ in. diam. Stipules entire. Pedicels shorter than the fruit .. .. 10. *S. reniforme.*
Leaves $\frac{1}{3}$–2 in. diam. Stipules usually ciliate-fimbriate. Pedicels longer than the fruit .. .. 11. *S. Haastii.*

2. **CENTELLA** Linn.

Perennial herbs, usually growing in moist shaded places. Stems long, slender, creeping and rooting at the nodes. Leaves reniform or ovate-cordate. Flowers small, whitish, in simple umbels. Calyx-teeth obsolete. Petals entire, imbricate. Involucral bracts conspicuous. Fruit laterally compressed, orbicular in outline; commissure narrow. Carpels flat, each with five primary ribs and with prominent secondary ribs and reticulations; the dorsal marginal and filiform.

A small genus of about 20 species, found in both hemispheres. It is closely allied to *Hydrocotyle*, but appears to be sufficiently distinct in possessing conspicuous involucral leaves, and in the carpels being furnished with secondary ribs and prominent reticulations.

1. **C. asiatica** *Urban in Mart. Fl. Bras.* xi, 1 (1879) 287. — Very variable in size. Stems rather stout, much branched, creeping and rooting at the nodes. Leaves fascicled at the nodes, ¼–1 in. diam., orbicular or oblong-reniform, cordate or almost truncate at the base, sinuate-toothed or nearly entire, glabrous or slightly pubescent; petioles very variable in length, ½–6 in. or more, often laxly pubescent above. Peduncles short. ¼–1 in.

Centella asiatica, (L). Urban.

= C. uniflora (Col.) Nannfeldt.

(probably an epharmonic species).

see T.N.Z.I. vol. 57, p. 63. (Ckn & Allan).

C

3. **AZORELLA** Lam.

Densely tufted herbs, often forming pulvinate masses of considerable size composed of compacted branches covered with the imbricated remains of old leaves. Leaves entire or toothed or ternately or palmately dissected. Peduncles shorter than the leaves or scarcely longer. Umbels few- or many-flowered; involucral bracts free or shortly connate at the base. Calyx-teeth prominent; either small and acute or petal-like and deciduous. Disc thick and fleshy, often confluent with the base of the styles. Carpels subterete or slightly dorsally compressed, 5-ribbed, the lateral ones not close to the commissure.

A species of about 50 or 60 species, chiefly found in Andine and Antarctic South America. The single species found in the New Zealand area has a wide distribution as an Antarctic circumpolar plant.

1. **A. Selago** *Hook. f. Fl. Antarct.* ii (1847) 284, t. 99. — Stems densely tufted, branched, forming large globular masses 1–4 ft. diam. or more, quite glabrous. Leaves alternate, imbricate, ⅕–⅓ in. long; petiole ½ the length, very broad, membranous, closely sheathing the stem; blade much dilated, broader than long, closely appressed, concave, coriaceous, 3–5-partite to the middle, upper surface furnished with several long stiff bristles; lobes spreading, oblong, acute or apiculate; margins quite

entire, much thickened. Umbels almost concealed amongst the uppermost leaves, shortly pedunculate, 3-flowered. Involucral leaves linear, subacute. Calyx-teeth acute. Fruits ovoid, terminated by the elongated styles; carpels slightly compressed, convex on the back, 5-ribbed, contracted at the commissure.—*Phil. Trans. Roy. Soc.* clxviii (1879) 20; *T. Kirk Students' Fl.* (1899) 191; *Cheesem. Man. N.Z. Fl.* (1906) 200; *Subantarct. Is. of N.Z.* ii (1909) 407; *Rep. Macquarie Is.* (1919) 26.

Macquarie Island: Sides of the hills, forming prominent globular masses often 4 ft. in diameter, *Fraser, J. H. Scott! A. Hamilton! H. Hamilton!*

Forms large convex masses composed of the closely packed stems and branches of the plant; the young shoots, with their leaves, forming a bright-green smooth and even crust or surface, so densely compacted as to bear the weight of a man. It is also found in Fuegia; Kerguelen Island; Crozets; Marion Island; Heard Island.

4. **SCHIZEILEMA** Domin.

Glabrous perennial herbs; rhizome stout or slender, putting out creeping and rooting stolons. Leaves reniform or orbicular, undivided or crenate-lobed or 3–5-foliolate; petioles always long. Umbels few- or many-flowered, simple or irregularly compound; involucral bracts free or connate. Calyx-teeth 5, prominent, persistent. Petals obtuse or acute, imbricate. Disc thick and flat, often confluent with the base of the styles. Fruit usually obtusely prismatic-tetragonous; carpels subterete or dorsally compressed; ribs 5 almost equidistant, the lateral ones not close to the commissure.

A genus of 13 species, of which 1 occurs in the Falkland Islands, another in Patagonia, a third in Victoria, and the remaining 10 are endemic in New Zealand. The genus has been very carefully monographed by Domin in Engler's Jahrbuch (vol. 40, pp. 573–85). The following disposition of the species is mainly based on Domin's work.

* Leaves 3–5-partite or -foliolate.

† Leaflets distinctly stalked.

Slender, creeping. Leaves membranous, 3-foliolate .. .. 1. *S. trifoliolatum.*

†† Leaflets or segments all sessile.

Small, densely matted; leaves 3-partite, segments entire or nearly so .. .. 2. *S. nitens.*
Small, coriaceous, leaflets bluntly lobed or crenate. Fruit longer than its pedicel .. .. 3. *S. hydrocotyloides.*
Larger, less coriaceous, leaflets obcuneate, 3–5-lobed. Fruit 3 or 4 times shorter than its pedicel .. .. .. 4. *S. Allanii.*
Large, robust, coriaceous. Fruit usually shorter than its pedicel 5. *S. Roughii.*
Slender, densely matted. Leaves membranous, 3-foliolate. Fruit shorter than its pedicel, involucral leaves obtuse .. .. 6. *S. pallidum.*
Small, leaves few, coriaceous, 3-foliolate. Involucral leaves acuminate .. .. 7. *S. Colensoi.*

** Leaves undivided.

† Minute, leaves entire or nearly so, $\frac{1}{10}$–$\frac{1}{4}$ in. diam.

Small creeping herb. Leaves entire; margins flat .. .. 8. *S. Cockaynei.*
Small tufted herb. Leaves obscurely 3-lobed or crenate; margins recurved .. .. 9. *S. exiguum.*

†† Much longer. Leaves reniform or orbicular-cordate, crenate-lobed.

Leaves $\frac{1}{3}$–$\frac{3}{4}$ in. diam. Stipules entire. Pedicels shorter than the fruit .. .. 10. *S. reniforme.*
Leaves $\frac{1}{3}$–2 in. diam. Stipules usually ciliate-fimbriate. Pedicels longer than the fruit .. .. 11. *S. Haastii.*

1. **S. trifoliolatum** *Domin in Engl. Bot. Jahr.* xl (1908) 578. — Very slender, with much of the habit and appearance of a *Hydrocotyle*. Stems filiform, branched, creeping and rooting at the nodes, 2–12 in. long. Leaves 2–6 at each node, membranous, glabrous or with a few scattered hairs, 3-foliolate; leaflets $\frac{1}{5}$–$\frac{1}{2}$ in. long, shortly stalked or sessile, obovate-cuneate to flabellate, irregularly 2–6-lobed or -toothed; lobes obtuse or apiculate; petioles slender, 1–4 in. long; stipules small, ciliate. Peduncles much shorter than the leaves, usually 2–3 springing from the same point. Umbels 2–8-flowered; involucral bracts subulate, ciliate or laciniate. Fruits obtusely tetragonous, longer than their pedicels; carpels rounded at the back, 5-ribbed.—Pozoa trifoliolata *Hook. f. Fl. Nov. Zel.* i (1853) 85, t. 18; *Handb. N.Z. Fl.* (1864) 88. P. microdonta *Col. in Trans. N.Z. Inst.* xxiii (1891) 387. Azorella trifoliolata *T. Kirk Students' Fl.* (1899) 193; *Cheesem. Man. N.Z. Fl.* (1906) 203. A. Hookeri *Drude in Engl. and Prantl. Pflanzenf.* iii, 8 (1898) 132. A. radians *Drude l.c.*

North Island: Auckland—Bed of Waipoua River, *Cockayne*. Taranaki—Coast between the Mokau River and White Cliffs, *T. F. C.* Hawke's Bay—Near Dannevirke, *Colenso!* Wellington—Ravines at the foot of Tongariro and Ruapehu, *T. F. C.*; Kaimanawa Mountains, *B. C. Aston!* Ruahine Mountains, *Colenso!* Tararua Mountains, *Petrie*. South Island: Not uncommon from Nelson and Marlborough to Foveaux Strait. Sea-level to 4000 ft. November–February.

A distinct and graceful little species, at once recognized by the long slender creeping stems; the trifoliolate leaves with the leaflets evidently stalked, and very irregularly lobed; and by the peduncles of the umbels much shorter than the leaves. Drude's name of *Azorella Hookeri* was given on account of the specific name of *trifoliolata* being preoccupied in *Azorella*; but that disqualification does not apply to *Schizeilema*.

2. **S. nitens** *Domin in Engl. Bot. Jahr.* xl (1908) 579.—Small, slender, perfectly glabrous, smooth and shining, densely matted. Rhizomes creeping, much branched and interlaced. Leaves few, minute, $\frac{1}{6}$–$\frac{1}{3}$ in. diam., 3-foliolate or 3-partite; leaflets sessile or shortly stalked, oblong-ovate to linear-obovate, obtuse or acute, entire or obscurely 2–3-toothed, rather thin, perfectly glabrous; petioles slender, $\frac{1}{2}$–$1\frac{1}{2}$ in. long. Peduncles as long or longer than the leaves, usually bearing a single terminal 2–3-flowered umbel with 1 or 2 3-lobed leaves below it, but often a secondary umbel is developed from the base of the primary one; involucral leaves linear, acute. Fruits minute, $\frac{1}{15}$ in. long, obtusely tetragonous, rather turgid, about equalling the pedicels; capsules obscurely 5-ribbed.—Azorella nitens *Petrie in Trans. N.Z. Inst.* xxv (1893) 270; *T. Kirk Students' Fl.* (1899) 193; *Cheesem. Man. N.Z. Fl.* (1906) 202.

South Island: Nelson—Cobb Valley, *F. G. Gibbs!* Lake Tennyson, *R. M. Laing*; Lake Guyon, *T. Kirk!* Marlborough—Upper Awatere, *Cockayne*. Canterbury—Broken River basin, *J. D. Enys! T. Kirk! T. F. C.*; Cass River, *Cockayne* and *Foweraker*; Mount Arrowsmith, *R. M. Laing* and *Cockayne*. Westland—Franz Josef Glacier, *Cockayne*. Otago—Lake Te Anau and Clinton Valley, *Petrie!* 700–3000 ft. December–January.

A very distinct little plant, in habit somewhat agreeing with small states of *Hydrocotyle tripartita*.

3. **S. hydrocotyloides** *Domin in Engl. Bot. Jahr.* xl (1908) 581.—Perfectly glabrous, stout, often densely matted. Root long and woody. Stems creeping and rooting at the nodes and putting up tufts of leaves, the runners sometimes 6 in. long or more. Leaves numerous, crowded, $\frac{1}{4}$–$\frac{2}{3}$ in. diam., orbicular or orbicular-reniform, very thick and coriaceous, 3–5-foliolate or -partite; leaflets sessile, sometimes overlapping, broadly

obovate-cuneate, bluntly 3–5-lobed or -crenate at the tip; margins thickened; petioles stout, ½–1½ in. long; stipules narrow, entire or ciliate. Peduncles variable in length, solitary from the nodes of the stem or 2–4 at the top of a leaf-bearing scion. Umbels 4–15-flowered; involucral bracts linear, obtuse. Fruit linear-oblong, tetragonous, usually longer than the pedicel; carpels 5-ribbed. — Azorella hydrocotyloides *T. Kirk Students' Fl.* (1899) 192; *Cheesem. Man. N.Z. Fl.* (1906) 202. Pozoa hydrocotyloides *Hook. f. Handb. N.Z. Fl.* (1864) 88.

North Island: Mount Holdsworth, Tararua Range, *W. Townson!* South Island: Mount Torlesse, *J. D. Enys! T. Kirk! T. F. C.;* Kowai River, *Haast;* Broken River, *J. D. Enys! T. F. C.;* Rangitata River, *Sinclair.* Otago—Kurow Mountains and Mount St. Bathan's, *Petrie!* Haast River and Makarora, *Poppelwell.* 2000–4500 ft. December–February.

The creeping stems and excessively coriaceous leaves are the best marks of this curious little plant. The fruit is longer than its pedicel, in that respect differing from *S. Colensoi*, with which it was compared by Hooker.

Petrie T. 56 13

4. **S. Allanii** *Cheesem. n. sp.*—Perfectly glabrous in all its parts, sending out creeping stolons often more than a foot in length, rooting and leafy at the nodes. Leaves tufted at the nodes, very variable in size and cutting; petiole very slender, 1½ to 6 or even 9 in. long; blade ¾–1½ in. diam., either 3-foliolate with the leaflets sessile or very rarely shortly stalked, or more or less deeply 3-lobed, the divisions obcuneate with 3–5 short rounded lobes; texture subcoriaceous; veins evident on both surfaces; margins thickened and recurved. Flowering shoots springing from the nodes, simple or branched, equalling or exceeding the leaves in length, naked or bearing a few trifid bracts. Umbels on slender peduncles, ½–¾ in. diam., 6–18-flowered; pedicels ⅓ in. long; involucral bracts linear, acuminate. Fruit about $\frac{1}{10}$ in. long, prismatic-tetragonous, 3 or 4 times shorter than its pedicel.

North Island: Maharahara Mountain, southern end of the Ruahine Mountains, near Woodville, alt. 4000 ft., *H. H. Allan!*

I am indebted to Dr. H. H. Allan for a copious suite of specimens of this interesting species. It is nearest to *S. hydrocotyloides*, from which it is separated by the larger size and much more slender and less coriaceous habit, and by the fruit being several times shorter than its pedicel.

(Hook. f.)

5. **S. Roughii** *Domin in Engl. Bot. Jahr.* xl (1908) 581.—Perfectly glabrous, smooth and shining. Rhizome stout, branched, terminated by numerous radical leaves, and usually with prostrate or ascending leafy flowering branches. Leaves ½–1½ in. diam., orbicular or reniform, coriaceous, 3–5-foliolate or -partite; leaflets sessile, broadly obcuneate, deeply crenate-toothed or lobed at the tip; lobes rounded; petioles 1–6 in. long; stipules usually laciniate. Flowering shoots often exceeding the leaves; umbels many-flowered, usually 1–3 secondary ones arising from the base of the primary and overtopping it; involucral bracts linear-oblong, obtuse. Pedicels usually longer than the linear-oblong fruit; carpels rounded at the back, 5-ribbed.—Pozoa Roughii *Hook. f. Handb. N.Z. Fl.* (1864) 89. Azorella Roughii *T. Kirk Students' Fl.* (1899) 192; *Cheesem. Man. N.Z. Fl.* (1906) 201.

South Island: Mountains of Nelson and Marlborough, from Dun Mountain and north-west Nelson southwards to the Buller Valley and Lake Tennyson, not uncommon. 2500–5000 ft. December–February.

This has the same habit as *A. Haastii*, but can always be recognized by the divided leaves. I have seen no specimens from the south of Lake Tennyson and the Upper Waiau.

6. **S. pallidum** *Domin in Engl. Bot. Jahr.* xl (1908) 580.—Pale-green, perfectly glabrous, smooth and shining. Rhizome creeping, leafy at the joints, and emitting creeping stolons. Leaves numerous, crowded, $\frac{1}{3}$–$\frac{3}{4}$ in. diam., orbicular or reniform, usually flaccid and membranous, rarely subcoriaceous, 3-foliolate or rarely 3-partite; leaflets obcuneate, 3–6-lobed at the tips; petioles slender, 1–3 in. long; stipules laciniate. Peduncles usually shorter than the leaves, either bearing a single terminal umbel with a 3–4-lobed leaf at its base, or with 2–3 long-stalked secondary umbels springing from the base of the primary one; sometimes the secondary umbels develop 1–2 tertiary ones in like manner. Umbels 4–12-flowered; involucral leaves linear, obtuse. Pedicels longer than the linear-oblong obtusely 4-angled fruits; carpels 5-ribbed.—Azorella pallida *T. Kirk Students' Fl.* (1899) 193; *Cheesem. Man. N.Z. Fl.* (1906) 202. Pozoa pallida *T. Kirk in Trans. N.Z. Inst.* x (1878) 419.

South Island: Nelson—Mount Arthur Plateau, *T. F. C.;* Lake Rotoiti and Upper Wairau Valley, *T. Kirk! T. F. C.;* Lake Guyon, *T. Kirk!* Lake Tennyson, *R. M. Laing.* Canterbury—Pukunui Creek, *T. Kirk!* Mount Torlesse, *Petrie!* Broken River, *J. D. Enys* and *T. F. C.;* Craigieburn Mountains, *Cockayne!* 1200–4000 ft. December–February.

7. **S. Colensoi** *Domin in Engl. Bot. Jahr.* xl (1908) 580.—Rhizome creeping, furnished with rosulate leaves at the nodes, and often emitting numerous filiform stolons. Leaves small; petioles slender, glabrous, $\frac{1}{4}$–$\frac{3}{4}$ in. long, furnished at the base with 2 adnate fimbriate stipules; laminae herbaceous, but barely membranous, glabrous or more commonly bearing a few 3–5-partite cilia; leaflets 3, rounded-cuneate, small, $\frac{1}{10}$–$\frac{1}{5}$ in. long, the two lateral sometimes shorter and more deeply 2-lobed, with the lobes obtuse, or all unequally 1–3-dentate, with the teeth subacute. Umbels simple, 6–10-flowered, long-peduncled; peduncles considerably longer than the leaves. Involucral leaves narrow-linear, acuminate. Fruit small, obtusely prismatic-quadrangular. Carpels with 5 slender but conspicuous ribs.—Pozoa trifoliolata *var.* tripartita *Hook. f. Fl. Nov. Zel.* i (1853) 85; *Handb. N.Z. Fl.* (1864) 88.

North Island: Hawke's Bay—Crags on Titiokura, *Colenso,* No. 1695.

This has not been observed since it was originally discovered by Colenso more than 75 years ago. Not having seen specimens, I have reproduced the main features of Domin's description. Hooker referred it, as a variety, to *S. trifoliolata;* but Domin, who has inspected the type specimens, considers that it is nearest to *S. pallidum,* from which it differs in the acuminate involucral leaves.

8. **S. Cockaynei** *Cheesem. n. comb.*—"A very small creeping herb, rooting at the nodes and emitting stolons, completely glabrous, perhaps an annual. Leaves simple, in small tufts; petiole $\frac{1}{3}$–$\frac{1}{2}$ in. long; blade $\frac{1}{10}$–$\frac{1}{5}$ in. diam., ovate-elliptic or suborbicular, simple, entire, fleshy-coriaceous, obtuse or slightly emarginate; margins not recurved. Cauline leaves opposite; petioles shorter. Stipules triangular-ovate, about $\frac{1}{6}$ in. diam. Involucral leaves ovate, concave, unequal. Umbels 3–4-flowered; pedicels stout, about $\frac{1}{10}$ in. long. Calyx after flowering pentagono-campanulate; teeth short, broadly triangular; petals minute, boat-shaped, deciduous."—Azorella Cockaynei *Diels in Rep. Nov. Sp. Regni. Veg.* vi (1908) 96; *Cockayne in Bot. Surv. Stewart Id.* (1909) 43.

South Island, Stewart Island: Otago—Lower slopes of Mount Ida; base of Takitimu Mountains, *Petrie!* Stewart Island: Salt meadows in Mason Bay, *R. M. Laing* and *Cockayne.*

Very closely allied to *S. exiguum*, but apparently differing in the much more slender habit of growth, in the usually entire leaves, which are thinner in texture, scarcely coriaceous, and do not have recurved margins, and (according to Dr. Diels) in some minor details of the inflorescence. The only specimens I have seen are few in number and in poor condition, and I have therefore availed myself of Dr. Diels's description, quoted by Dr. Cockayne.

9. **S. exiguum** (Hook.) *Domin in Engl. Bot. Jahr.* xl (1908) 585.—Small, stemless, forming little tufts ½–2 in. diam. Leaves numerous, crowded at the top of a short and stout rhizome, ¼–¾ in. long; petiole long, stout, sheathing at the base; blade minute, ⅙–¼ in. diam., ovate-orbicular, obscurely 3-lobed or crenate, cordate or rounded at the base, coriaceous, minutely papillose above; margins recurved. Scapes shorter or rarely longer than the leaves, 3–8-flowered; involucral leaves linear, obtuse, rounded at the base. Fruit $\frac{1}{12}$ in. long, almost tetragonous; carpels 5-ribbed, rounded at the back.—Azorella exigua *T. Kirk Students' Fl.* (1899) 191; *Cheesem. Man. N.Z. Fl.* (1906) 200. Pozoa exigua *Hook. f. Handb. N.Z. Fl.* (1864) 87; *Buch. in Trans. N.Z. Inst.* xiv (1882) 345, t. 26, f. 2.

South Island: Otago—Black Peak, *Hector* and *Buchanan! A. McKay;* Hector Mountains and Mount Cardrona, *Petrie!* Lake Harris Saddle, *W. A. Thomson!* Altitudinal range from 5000 to 6500 ft.

This species and *S. Cockaynei* form a very distinct little group, widely deviating from all the other members of the genus in the diminutive size, almost stemless habit, and in the leaves being either quite entire or only very obscurely lobed.

10. **S. reniforme** (Hook.) *Domin in Engl. Bot. Jahr.* xl (1908) 581.—Bright-green, rather fleshy, perfectly glabrous. Rhizome slender, creeping, often emitting short stolens. Leaves tufted, ⅓–¾ in. diam., orbicular or reniform, crenate-lobed, coriaceous or almost membranous; petioles rather stout, 1–2 in. long, sheathing at the base; stipules acute or acuminate, quite entire, not ciliate. Umbels 3–8-flowered, on rather stout peduncles much shorter than the leaves; involucral bracts linear, obtuse, membranous. Fruit ⅛ in. long, linear-oblong, tetragonous, rather longer than its pedicel; carpels obscurely 5-ribbed.—Pozoa reniformis *Hook. f. Fl. Antarct.* i (1844) 15, t. 11; *Handb. N.Z. Fl.* (1864) 88. Azorella reniformis *T. Kirk Students' Fl.* (1899) 191; *Cheesem Man. N.Z. Fl.* (1906) 200; *Subantarct. Is. of N.Z.* ii (1909) 407.

Auckland and Campbell Islands: *Hooker, T. Kirk! Cockayne, B. C. Aston! J. S. Tennant!* December–January.

11. **S. Haastii** (Hook.f.) *Domin in Engl. Bot. Jahr.* xl (1908) 582.—Variable in size, 2–10 in. high, smooth and glabrous. Rhizome stout, thick and fleshy, with tufts of radical leaves at the nodes; often throwing out prostrate or ascending leafy and flowering branches. Leaves ½–2 in. diam., reniform and orbicular, with usually an open sinus, quite glabrous, coriaceous or almost fleshy, bright-green and glossy, crenate-lobed; lobes broad, shallow, rounded; margins thickened, cartilaginous; petioles variable in length, ¾–8 in.; stipules broad, usually more or less ciliate-fimbriate. Umbels peduncled, many-flowered; often 1–3 secondary umbels arise from the base of the primary one and far exceed it; involucral leaves linear-oblong or linear-spathulate, obtuse. Pedicels usually 3–4 times as long as the oblong tetragonous fruit. Carpels obscurely 5-ribbed.—Pozoa

Haastii *Hook. f. Handb. N.Z. Fl.* (1864) 88. Azorella Haastii *T. Kirk Students' Fl.* (1899) 192; *Cheesem. Man. N.Z. Fl.* (1906) 201. Pozoa elegans *Col. in Trans. N.Z. Inst.* xxiii (1891) 386.

Var. **cyanopetalum** *Domin l.c.* 583 (as a subspecies).—Smaller and more slender; rhizome thin. Upper surface of leaves often bristly with erect hairs. Pedicels not much longer than the fruit. Petals sometimes dark-blue (in dried specimens).

North Island: Ruahine Mountains, *A. Hamilton! B. C. Aston.* South Island: Not uncommon in mountain districts from Cook Strait to Otago. 2000–5000 ft. December–February. Var. *cyanopetalum:* Brunner Range, north-west Nelson, *W. Townson!* mountains above Arthur's Pass, *T. F. C.;* Waimakariri Glacier, *J. D. Enys!* Rakaia Valley, *W. W. Smith.*

The nearest ally of *S. Haastii* is undoubtedly the Auckland Islands *S. reniforme,* which only differs in its smaller size, entire stipules, few-flowered umbels, and fruit always longer than its pedicel. But reduced states of *S. Haastii* come very near to *A. reniforme,* and in fact have been mistaken for it both by myself and the late Mr. Kirk (see "Students' Flora," p. 192).

Domin's variety *cyanopetalum* will probably stand as a variety if based on the characters quoted above. He describes it as possessing "blue petals." This I believe to be incorrect so far as the fresh state is concerned, but I have frequently noticed the petals to take on a bluish tinge when drying.

5. **ERYNGIUM** Linn.

Perennial herbs. Leaves usually rigid and coriaceous, spinous-toothed, entire lobed or dissected. Flowers sessile in dense heads, with a bracteole under each flower, and a whorl of rigid often spinous-pointed bracts at the base of the head. Calyx-tube clothed with hyaline scales; teeth rigid, acute. Petals narrow, erect, deeply notched, with a long inflected point. Fruit ovoid or obovoid, scarcely compressed, covered with hyaline scales or tubercles; carpels semi-terete, primary ridges obscure, secondary wanting; vittae inconspicuous or absent.

A large genus of over 220 species, spread through most temperate and subtropical regions, but most plentiful in South America and western Asia. The single species found in New Zealand extends to Australia as well.

1. **E. vesiculosum** *Lab. Nov. Holl. Pl.* i (1804) 73, t. 98.—A harsh and rigid spinous herb 2–9 in. high, with tufted radical leaves and prostrate stems much resembling stolons but not rooting. Radical leaves crowded, rosulate, 3–6 in. long, lanceolate or oblanceolate or spathulate-lanceolate, deeply toothed or almost pinnatifid, the teeth spinescent, narrowed into a broad flat petiole. Cauline leaves much smaller, opposite, cuneate or linear-cuneate, with fewer spinous teeth. Peduncles radical or from the nodes, $\frac{1}{2}$–2 in. long, bearing a single globose or broadly ovoid head $\frac{1}{2}$–$\frac{3}{4}$ in. diam. Involucral bracts linear or lanceolate, rigid and spinous, spreading, far exceeding the flowers. Calyx-tube densely scaly.—*Hook. f. Fl. Nov. Zel.* i (1853) 85; *Handb. N.Z. Fl.* (1864) 90; *Benth. Fl. Austral.* iii (1866) 370; *T. Kirk Students' Fl.* (1899) 194; *Cheesem. Man. N.Z. Fl.* (1906) 203. T. 75:190, 71:88, 72:325.

North and South Islands: On sandy and gravelly beaches from the East Cape to the north of Otago, but often local. December–January. Also in Australia and Tasmania.

6. **ACTINOTUS** Labill.

Annual or perennial herbs, erect and branching or low and densely tufted. Leaves toothed, lobed or ternately divided. Umbels simple, with an involucre of spreading bracts. Calyx-limb 5-toothed, rarely inconspicuous. Petals 5, unguiculate or spathulate or wanting. Ovary 1-celled, 1-ovuled; styles 2, often united at the base. Fruit ovate, of a single carpel, compressed from front to back; ribs 5, often obscure.

A small genus of about 10 species, confined to Australia and New Zealand. It is remarkable for the 1-celled ovary and single carpel of the fruit.

1. **A. suffocata** *Rodway Tasm. Fl.* (1903) 65.—Small, densely tufted. Stems creeping, interlaced and matted, forming flat compact patches. Branches villous or shaggy with soft white hairs. Leaves $\frac{1}{12}$–$\frac{1}{6}$ in. long, oblong or oblong-spathulate, narrowed into a long sheathing petiole, quite entire, coriaceous and fleshy, glandular at the apex, glabrous or with a pencil of hairs at the tip. Peduncle $\frac{1}{4}$–$\frac{3}{4}$ in. long, usually villous with soft spreading hairs, naked or with a single bract towards the top. Involucral bracts usually 5, broadly ovate or almost rounded, obtuse. Flowers 4–5. Calyx-limb apparently wanting. Petals absent. Stamens 2. Carpels somewhat compressed, convex on the outer face, obscurely ribbed.—A. novae-zelandiae *Petrie in Trans. N.Z. Inst.* xiii (1881) 324; *T. Kirk Students' Fl.* (1899) 195; *Cheesem. Man. N.Z. Fl.* (1906) 204. Hemiphues suffocata *Hook. f. in Lond. Journ. Bot.* vi (1847) 471 (*bis*). H. bellidioides *var.* suffocata *Hook. f. Fl. Tasm.* i (1860) 158, t. 36A; *Benth. Fl. Austral.* iii (1866) 369.

South Island: Nelson—Mountains near the Heaphy River, *J. Dall!* Mount Rochfort, *Spencer! W. Townson!* Otago—Blue Mountains, *Petrie!* Longwood Range, *T. Kirk.* Stewart Island: Apparently abundant in bogs, *Petrie! Thomson! Cockayne.* Sea-level to 3500 ft. Also in Tasmania, where it was first discovered.

Hooker's plate in the "Flora of Tasmania" admirably represents the New Zealand plant, and as his specific name of "*suffocata*" is unquestionably entitled to priority I am using it here.

7. **OREOMYRRHIS** Endl.

Perennial herbs, tufted or more rarely diffusely branched, glabrous pubescent or villous. Leaves pinnately divided or decompound. Umbels simple, solitary on a scape or peduncle; involucral bracts numerous, ovate or lanceolate. Calyx-teeth obsolete. Petals oblong, acute, with a short incurved tip. Fruit oblong or linear-oblong, usually tapering to the apex, slightly compressed laterally; carpels subterete, with 5 equal obtuse ribs, the 2 lateral ones close to the commissure. Vittae 1 in each furrow and 2 on the commissural face. Seed nearly terete, but grooved on the commissural side.

A genus of 6 or 7 species. Six of these are natives of America, from Mexico to the Falkland Islands, one of them extending to Australia and New Zealand. Another species has recently been found in New Guinea.

1. **O. andicola** *Endl. Gen. Plant.* (1839) 787.—Exceedingly variable in stature and habit, 2–24 in. high, either stemless with radical leaves and scapes or much branched from the base, with short or long slender sparingly divided leafy stems, glabrescent or tomentose or pilose. Leaves usually numerous, mostly radical, 1–6 in. long, linear-oblong, pinnate or 2-pinnate;

leaflets pinnatifid or variously toothed or incised. Peduncles several, usually springing from the rootstocks, but in the branched varieties axillary as well, longer or shorter than the leaves, glabrescent or pilose, especially towards the tip, where the hairs are usually reversed. Umbels few- or many-flowered; involucral bracts 6–8, ovate to linear. Flowers at first sessile, but pedicels lengthening as the fruit ripens, often unequally so. Fruit linear- or ovate-oblong, glabrous or more or less densely pubescent.—*Hook. f. Fl. Antarct.* ii (1847) 288, t. 101; *Benth. Fl. Austral.* iii (1866) 377; *T. Kirk Students' Fl.* (1899) 197; *Cheesem. Man. N.Z. Fl.* (1906) 206.

Var. **Colensoi** *T. Kirk l.c.* 198.—Leaves all radical, pinnate or 2-pinnate; leaflets pinnatifid or incised, ultimate segments acute. Scapes numerous, simple.—O. Colensoi *Hook. f. Fl. Nov. Zel.* i (1853) 92; *Handb. N.Z. Fl.* (1864) 91. O. Haastii *Hook. f. l.c.*

Var. **rigida** *T. Kirk l.c.*—Stems stout, branched at the base only, 4–8 in. high. Leaves 2-pinnate, pubescent or tomentose; leaflets pinnatifid or deeply incised. Scapes stout and rigid, often depressed. Fruits linear.

Var. **ramosa** *T. Kirk l.c.*—Stems slender, much branched, often 2 ft. long. Leaves pinnate; leaflets membranous, distant, the lowest petioled, deeply 3–5-lobed or -partite or again pinnate, ultimate segments obtuse or subacute. Peduncles axillary, longer or shorter than the leaves, 3–8-flowered; pedicels unequal, sometimes 2 in. long. Fruits glabrous or pubescent.—O. ramosa *Hook. f. Handb. N.Z. Fl.* (1864) 91. Mr. Kirk's var. *apiculata* appears to be a form of this.

North and South Islands, Chatham Islands: Abundant from the East Cape southwards. Sea-level to 4500 ft. November–February. Also in Australia and Tasmania and in South America.

As in the first edition of this work, I have followed Mr. Bentham and the "Index Kewensis" in uniting the three New Zealand species described by Hooker with the American and Australian *O. andicola*. Any large series of specimens will show that the development or non-development of a branched stem, and the amount of pubescence, which were the characters relied upon for the separation of the species, are in *Oreomyrrhis* far too variable and inconstant to be employed for that purpose.

8. **CRANTZIA** Nutt.

A small creeping herb. Leaves linear, terete or compressed, undivided, transversely septate. Umbels simple, with minute involucral bracts. Flowers minute. Calyx-teeth small. Petals concave, acute, imbricate in the bud. Fruit ovoid-globose, slightly flattened laterally. Carpels nearly terete, with 5 ribs separated by furrows, the lateral ribs forming a thick and corky mass near the commissure. Vittae 1 under each furrow and 2 at the commissure.

A monotypic genus, found in the United States and Mexico, extra-tropical and Andine South America, Australia and Tasmania, and New Zealand.

1. **C. lineata** *Nutt. Gen. N. Amer. Pl.* i (1818) 177.—Perfectly glabrous. Rhizome slender, creeping and rooting at the nodes, 2–6 in. long or more. Leaves usually tufted at the nodes, variable in size, $\frac{1}{2}$–4 in. long, narrow-linear, fistulose, terete or subcompressed, obtuse at the tip, transversely septate internally. Peduncles axillary, shorter than the leaves, filiform, bearing a single 2–8-flowered umbel. Flowers white. Fruit $\frac{1}{12}$ in. long.—*Hook. f. Fl. Antarct.* ii (1847) 287, t. 100; *Fl. Nov. Zel.* i (1853) 87; *Handb. N.Z. Fl.* (1864) 89; *Benth. Fl. Austral.* iii (1866) 374; *T. Kirk Students' Fl.* (1899) 199; *Cheesem. Man. N.Z. Fl.* (1906) 207. Lilaeopsis lineata *Greene in Pittonia* ii (1891) 192.

Journ. Linn. Soc. XLVII 525 (1927) AW.H.
Kew Bull. 1929 p. 119. 3. Kew. Bull. 1935. 417.

A. W. HILL'S ARRANGEMENT OF LILAEOPSIS IN NEW ZEALAND

1. L. novae-zelandiae (Gandog.) A. W. Hill. Species fructibus ovoideis, costis subacutis lateralibus majoribus, vitiis 8 distincta. Herba caespitosa; rhizoma repens. Folia 3 - 12 cm. longa, attenuata. Umbella tenuis, 3 - 4 flora, bracheis involucri 2 - 2.5 mm. longis; pedunculi 1 - 2 cm. longi, pedicellis 5 - 7 mm. longis. Fructus ovoideus, 1.25 mm. longus, 1.5 - 1.75 mm. latus, costis distinctis subacutis lateralibus majoribus, lateralibus in sectione transversali conspicuis lignosis; vittae 8, quarum 4 commissurales (Type): Tomahawk Lagoon (1896), G. M. Thomson in Herb. Gandog. (& other localities).

2. L. lacustris A. W. Hill. Species fructibus cylindricis, costis rotundatis, vittis 6 distincta. Rhizoma repens. Folia 8 - 15 cm. longa, filiformia, septis distantibus. Umbella 5 - 7 flora; pedunculi 2 - 3 cm. longi, pedicellis 1 - 1.5 cm. longis. Fructus cylindricus, 2 mm. longus, 1 mm. latus, costis rotundatis, vittae 6, quarum 2 commissurales. Lake Rotorua, Berggren; Lake Rotokakahi, T. Kirk; Wellington, Dr. Hector; Thames R., T.F.C.; Auckland, Cheeseman?

3. L. orbicularis A. W. Hill; Species fructibus orbicularibus sine costis conspicuis distincta. Rhizoma repens. Folia 2.5 - 7 cm. longa, 0.5 - 1 mm. lata, attenuata vel folia breviora paullo spathulata, septis numerosis. Umbella 2 - 5 flora; pedunculi breves; pedicelli 0.75 - 1 cm. longi, fructo maturo curvati; bracteae involucri 1 - 2 mm. longae, ovoideae. Fructus orbicularis, 2 - 2.5 mm. longus, 2.25 - 2.5 mm. latus, costis rotundatis inconspicuis in sectione transversali, pericarpio magnis e cellulis parenchymatis sine cellulis scleroticis composito; vittae 5 - 7, quarum 2 commissurales. Hawke's Bay; Tutira, Guthrie-Smith (March 1928) in Herb. Kew (type); Auckland, Cheeseman (Dec. 1878) in Herb. Edinb.

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North and South Islands, Stewart Island, Chatham Islands: Abundant in wet places from the North Cape southwards. Sea-level to 2500 ft. November–February.

A very variable little plant. When completely submerged the leaves are fistulose and terete, softer in texture, and usually much larger; but when growing in places that are dry for a considerable part of the year the leaves are often much compressed and minute. American botanists maintain that *Crantzia* of Nuttall is antedated by *Crantzia* of Scopoli, published as far back as 1777, and have adopted the name of *Liljaeopsis* (Greene) in its place.

9. **APIUM** Linn.

Erect or prostrate glabrous herbs. Leaves ternately or pinnately divided. Umbels compound, leaf-opposed or terminal. Involucral bracts usually wanting. Flowers white. Calyx-teeth obsolete. Petals ovate, concave, usually inflected at the tip. Fruit ovate or broader than long, slightly compressed laterally, constricted at the commissure. Carpels ovoid, with five prominent obtuse nearly equal ribs. Vittae 1 under each furrow and 2 on the commissural side.

A genus of about 25 species, widely dispersed in most parts of the world. In addition to the two indigenous species, two others have become naturalized in New Zealand—the wild celery (*A. graveolens* Linn.), which is very closely allied to *A. prostratum*, differing chiefly in the erect habit and thinner ribs to the carpels; and *A. leptophyllum* F. Muell., a common plant in many warm climates, and which can be recognized by the slender habit and ternately divided leaves with filiform segments.

Decumbent or suberect; branches stout; leaves pinnate or 2-3-pinnate .. .. 1. *A. prostratum.*

Smaller, prostrate; branches slender; leaves 3-foliolate .. .. 2. *A. filiforme.*

1. **A. prostratum** *Lab. Relat.* i (1799) 141.—Root stout, sometimes as thick as the thumb. Stems stout, prostrate or decumbent, more rarely suberect, often rooting at the base, 10–24 in. long or more, much branched, grooved, quite glabrous. Leaves variable, 3–9 in. long, pinnate or 2-3-pinnate; leaflets sessile or petiolate, 3-partite; segments broad or narrow, subcoriaceous or almost fleshy, incised or again deeply lobed. Umbels sessile or very shortly pedunculate; rays 4–15, $\frac{1}{2}$–2 in. long, each bearing a secondary umbel of rather small white flowers on slender pedicels $\frac{1}{4}$ in. long. Involucral bracts wanting. Fruit broadly ovoid, glabrous, $\frac{1}{12}$–$\frac{1}{10}$ in. long.—*Pl. Nov. Holl.* i (1804) 76, t. 103; *T. Kirk Students' Fl.* (1899) 196; *Cheesem. Man. N.Z. Fl.* (1906) 205. A. australe *Thouars Fl. Trist. d'Acugn.* 43; *Hook. f. Fl. Nov. Zel.* i (1853) 86; *Handb. N.Z. Fl.* (1864) 90; *Benth. Fl. Austral.* iii (1866) 372. Petroselinum prostratum *DC. Prodr.* iv (1830) 102; *A. Rich. Fl. Nouv. Zel.* (1832) 278; *A. Cunn. Precur.* (1838) n. 503.

Var. **a.**—Stems usually stout. Leaves pinnate; leaflets cut into numerous broad-obovate or obcuneate segments.

Var. **b.**—Stems not quite so stout; leaflets cut into numerous linear or lanceolate acute segments.—*Hook. Ic. Plant.* (1841) t. 305.

Kermadec Islands, North and South Islands, Stewart Island, Antipodes Island: Common throughout on the shores. Also in Australia and Tasmania, Antarctic America, South America, South Africa, and Tristan d'Acunha.

2. **A. filiforme** *Hook. Ic. Plant.* (1852) t. 819.—Much smaller than *A. prostratum*, and with much more slender and more prostrate stems 6–15 in. long. Leaves 3-foliolate, 2–5 in. long including the long and

slender petiole, thin and membranous, quite glabrous; leaflets petioled, the middle one 3-lobed at the apex, the lateral 2-dentate, more or less inequilateral; obovate or orbicular-cuneate. Umbels much smaller than in *A. prostratum*, often peduncled; secondary rays 5–15. Flowers small, white. Fruit variable in size; ribs thick and spongy.—*Hook. f. Fl. Nov. Zel.* i (1853) 86; *Handb. N.Z. Fl.* (1864) 99. Petroselinum filiforme *A. Rich. Fl. Nouv. Zel.* (1832) 278; *A. Cunn. Precur.* (1838) n. 504. A. prostratum *var.* filiforme *T. Kirk Students' Fl.* (1899) 196; *Cheesem. Man. N.Z. Fl.* (1906) 205.

North and South Islands, Stewart Island: Not uncommon along the coast-line throughout. Inland by the Opuatia Creek and other localities in the Lower Waikato Valley, *T. Kirk, T. F. C.*

Although closely related to *A. prostratum*, to which I referred it in the first edition of this work, I now think that its differential characters are sufficient to maintain its distinction as a separate species.

T. 57 (1926) 28
T. 47: 41.

10. **ACIPHYLLA** Forst. 1776

Erect and rigid usually spinescent glabrous perennials, often of large size. Leaves thick and coriaceous, pinnate or 2–3-pinnate, the rhachis transversely jointed at the insertion of the leaflets, leaf-segments usually ending in stout rigid spines. Umbels compound, in the axils of spinescent floral leaves or bracts, usually forming a more or less dense paniculate or spicate inflorescence; male umbels much more lax than the females. Flowers unisexual, usually dioecious. Calyx-teeth small or obsolete. Petals incurved, rarely with an inflexed tip. Stylopodia depressed in the male flowers, erect and conical in the female. Fruit oblong or linear-oblong; carpels with narrowly winged ridges, usually one 5-winged and the other 4-winged, or both 5-winged or 4-winged, or not rarely one carpel is 3-winged and the other 4-winged. Vittae 1–3 under each furrow and 2–5 on the commissural face.

A genus confined to New Zealand, with the exception of two species found in the Australian Alps. It is mainly characterized by its remarkably distinct habit and spinescent leaves and bracts; but the flowers and fruit are very similar to those of *Anisotome*, and, to a smaller extent, to those of the northern genus *Ligusticum*. The three genera were in fact united by Bentham in the "Genera Plantarum," but this course has not been generally adopted by botanists.

The New Zealand species of *Aciphylla* are very difficult of discrimination, and much has yet to be done before a stable arrangement of the species can be arrived at. In the first edition of this work 12 species were admitted; in the present edition I have had to increase that number to 25, and there are still four or five others in my own herbarium or Mr. Petrie's which may prove to be distinct. A preliminary notice of one of these has been given by Mr. Petrie under the name of *A. Crosby-Smithii* (Trans. N.Z. Inst. xlvii (1915) 48). Mr. Petrie compares it with *A. Spedeni*, but it does not seem to me to show any close affinity with that plant. Until flowering or fruiting specimens are obtained it is almost impossible to trace the true relationships of the plant.

A. Tall and stout, 2–5 ft. or more. Inflorescence a dense linear-oblong panicle, often several feet in length.

2–8 ft. high. Leaves 1–2-pinnate; leaflets broad, $\frac{1}{4}$–$\frac{3}{4}$ in., excessively rigid and spinous. Middle lobe of bract not refracted .. .. 1. *A. Colensoi.*

2–6 ft. high. Leaves 2–3-pinnate; leaflets narrow, $\frac{1}{8}$–$\frac{1}{6}$ in. broad. Middle lobe of bract refracted .. .. .. 2. *A. squarrosa.*

1–3 ft. high. Leaves pinnate; leaflets $\frac{1}{4}$–$\frac{1}{2}$ in. broad, transversely jointed. Fruit narrow linear-oblong .. .. 3. *A. Traversii.*
$1\frac{1}{2}$–2 ft. high. Leaves 2–3-pinnate; leaflets $\frac{1}{8}$–$\frac{1}{6}$ in. broad. Inflorescence narrow-oblong, 6–15 in. long .. .. 4. *A. intermedia.*

B. Smaller, 6–24 in. Male inflorescence paniculate, linear-oblong; female much contracted, almost concealed in the sheaths of the bracts.

$1\frac{1}{4}$–2 ft. high. Leaves pinnate with most of the pinnae trifoliolate; segments 2–5 in. long. Bracts numerous, spreading, rigid .. .. 5. *A. indurata.*
6–12 in. high. Leaves 1–2-pinnate; segments short, $\frac{1}{6}$–$\frac{1}{2}$ in., flat, squarrose, grooved above .. .. 6. *A. Hookeri.*
12–24 in. high. Stems stout, grooved. Leaves pinnate, leaflets 3–9 in. long, $\frac{1}{10}$–$\frac{1}{5}$ in. broad. Inflorescence long and narrow, 5–12 in. long, $1\frac{1}{2}$–4 in. broad; bracts crowded, rigid .. 7. *A. Lyallii.*
12–18 in. high, stems slender. Leaves pinnate or 2-pinnate at the base, somewhat flaccid. Inflorescence 5–15 in. long, often flaccid. Midrib of leaves and bracts often red .. .. 8. *A. crenulata.*
6–12 in. high, slender, smooth and grassy. Leaves pinnate or 2-pinnate at the base; segments $\frac{1}{30}$–$\frac{1}{20}$ in. broad .. .. 9. *A. Townsoni.*

C. Small, 4–18 in. high, pinnate or 2–3-pinnate. Both male and female inflorescence broad and paniculate.

4–14 in. high. Leaves strictly pinnate, never bipinnate, 3–10 in. long; segments $\frac{1}{8}$–$\frac{1}{4}$ in. broad. Flowering stem stout .. 10. *A. similis.*
4–14 in. high. Leaves pinnate, often 2-pinnate at the base; ultimate segments 1–$1\frac{1}{2}$ in. long, $\frac{1}{10}$–$\frac{1}{6}$ in. broad .. .. 11. *A. Monroi.*
4–12 in. high. Leaves firm but barely coriaceous, 2–3-pinnate; leaflets narrow, $\frac{1}{30}$–$\frac{1}{20}$ in. broad. Panicle very lax and open 12. *A. polita.*
6–18 in. high. Leaves coriaceous, 4–15 in., 3-pinnate; ultimate segments linear, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, $\frac{1}{10}$–$\frac{1}{8}$ in. broad. Inflorescence forming a globose head 2–4 in. diam. .. .. .. 13. *A. divisa.*
9–18 in. high, densely tufted, rigid and coriaceous. Leaves 5–10 in., 3-pinnate; ultimate segments very narrow, almost filiform, $\frac{1}{30}$ in. broad. Inflorescence a dense globose head 3–4 in. diam. .. .. 14. *A. multisecta.*

D. Small, 4–15 in. high. Leaves 3-foliolate; rarely pinnate or 2-pinnate. Male and female inflorescence both narrow.

Stout, 8–15 in. high. Leaves usually 3-foliolate; leaflets 3–6 in. long, $\frac{1}{6}$–$\frac{1}{4}$ in. broad. Inflorescence 5–8 in. long, linear or lanceolate .. .. 15. *A. trifoliolata.*
Slender, strict, 6–18 in. high. Leaves 6–14 in. Petiole long; lamina trifoliolate; leaflets 2–5 in., linear. Inflorescence narrow; sheaths of the female flowers inflated, concealing the flowers .. .. 16. *A. Cuthbertiana.*
Rhizome creeping, branched. Stems 4–9 in. high. Leaves 4–8 in., flaccid, 3-foliolate; leaflets divergent, deeply pinnatisect; segments narrow-linear. Flowering stems short, often not exceeding the leaves .. .. 17. *A. pinnatifida.*
Stems 10–15 in. Leaves usually trifoliolate; leaflets $1\frac{1}{2}$–4 in. long, $\frac{1}{6}$–$\frac{1}{5}$ in. broad, narrow-linear. Inflorescence a contracted spike-like panicle 2–5 in. long .. .. 18. *A. Hectori.*
Stout, smooth, polished, 6–12 in. high. Leaves 4–9 in. long, $\frac{1}{4}$–$\frac{1}{2}$ in. broad, simple or forked or 3-foliolate, very thick and rigid. Inflorescence broad, rigid and spinous .. .. 19. *A. Kirkii.*
Small, tufted, 3–8 in. high. Leaves usually 3-foliolate; leaflets 1–3 in. long, $\frac{1}{12}$–$\frac{1}{8}$ in. broad. Flowering stem slender, often flexuous. Sheaths of female inflorescence inflated, concealing the flowers .. .. 20. *A. Traillii.*
Small, tufted, 3–10 in. high. Leaves usually 3-foliolate; leaflets $1\frac{1}{2}$–4 in. long, $\frac{1}{12}$–$\frac{1}{4}$ in. broad. Flowering stems stout, straight. Inflorescence $1\frac{1}{2}$–4 in. long; bracts very numerous, spinous 21. *A. Poppelwelli.*

Aciphylla Sc. Th. Townsoni Cockayne & Allan
Porter's Pass: Scott Thomson & Simpson - see Allan
T. 57 (1927) D. 45.

E. Forming large or small, simple or branched masses 4–12 in. diam. Leaves excessively rigid and coriaceous, pungent, smooth and polished. Umbels forming a terminal globose head.

Leaves very densely imbricating, 4–8 in. long, pinnately divided into 2–4 pairs of closely placed pinnae with a terminal one. Umbels forming a globose head 4–5 in. diam. .. .. 22. *A. congesta.*
Leaves densely imbricating, 4–6 in. long, flabellately divided into 6–9 leaflets. Umbels forming a globose head 3–4 in. diam... 23. *A. Spedeni.*
Leaves densely imbricating, 3-fid to the top of the sheath, divisions linear-subulate, pungent-pointed. Umbels forming a globose head 2–3 in. diam. .. .. 24. *A. Dobsoni.*
Leaves densely imbricating, quite entire, 1½–4 in. long, concave above, rounded beneath. Umbels forming a dense or lobed rounded head .. .. 25. *A. simplex.*

1. **A. Colensoi** *Hook. f. Handb. N.Z. Fl.* (1864) 92.—Stem stout, erect, 2–5 ft. high, 2–3 in. diam. at the base, deeply grooved. Radical leaves numerous, forming a circle of bayonet-like spikes round the base of the stem, 1–2½ ft. long, pinnate or 2-pinnate at the base, with few secondary leaflets; leaflets 5–15 in. long, ¼–½ in. wide or more, narrow-linear, acuminate, terminating in a long and stout spine, excessively thick and coriaceous, rigid, striate, margins rough with minute serrulations; sheaths broad, sometimes quite 2 in. across, very thick and coriaceous, produced on each side above into a spinous simple or forked narrow-linear leaflet 2–6 in. long. Inflorescence a narrow-oblong cylindrical panicle composed of numerous umbels on branched peduncles springing from the axils of spinous bracts; male inflorescence much more lax than the female. Bracts with broad sheaths and a 3–5-partite limb, the middle segment much the longest, not refracted. Flowers white; calyx-teeth obsolete. Fruit oblong, ¼–⅓ in. long; carpels usually one 4-winged the other 3-winged, but sometimes both 4-winged or both 3-winged. Vittae 2–4 in the interspaces and 5–6 on the commissural face.—*Lindsay Contr. N.Z. Bot.* (1868) 49, t. 1; *T. Kirk Students' Fl.* (1899) 207; *Cheesem. Man. N.Z. Fl.* (1906) 208. A. squarrosa *var. b* latifolia *Hook. f. Fl. Nov. Zel.* i (1853) 88.

Var. **conspicua** (*T. Kirk l.c.*)—Leaf-segments not so rigid, with a broad orange or red midrib. Bracts bright-orange, often pinnately divided.

Var. **maxima** (*T. Kirk l.c.*)—Taller and stouter, 4–10 ft. high or even more, 2–4 in. diam. at the base. Leaves 1½–5 ft. long; segments ¾ in. broad or even more, still more rigid and pungent. Peduncles and pedicels longer. Fruit larger, ⅔ in. long.

North and South Islands: Common in mountain districts from the East Cape to Southland; most abundant between 1000–3000 ft., but ascending to nearly 5000 ft., and occasionally coming down to sea-level. Var. *conspicua:* North Island: Locality not stated, *Herb. Colenso!* Ruahine Mountains, *W. F. Howlett!* South Island: Wangapeka, *Kingsley;* Mount Murchison, *W. Townson!* Upper Waimakariri, *Cockayne! T. F. C.* Var. *maxima:* Mountain districts from Nelson to Otago, not uncommon. *Taramea; Spaniard.* December–January.

By far the finest species of the genus; easily distinguished from all others by the large size and broad leaf-segments. The two varieties described above have a very distinct appearance, but the differences are hardly of specific value. At the Broken River, Canterbury, I have measured a specimen of var. *maxima* nearly 13 ft. high.

2. **A. squarrosa** *Forst. Char. Gen.* (1776) 136, t. 68.—Stem tall, stout, erect, 2–6 ft. high, 2–4 in. diam. below, deeply grooved, surrounded at the base by the numerous spreading spinous-pointed leaves. Radical leaves 1–3 ft. long, 2–3-pinnate; ultimate leaflets crowded, 6–12 in. long or more, very narrow-linear, ⅙–⅛ in. broad, coriaceous and rigid, deeply striate,

A. leighii Allan. T. 69 (1940) 270.

gradually narrowed into rigid spinous points, margins rough with minute serrulations; sheaths broad, produced above on each side into a long

new species.

Aciphylla scott-thomsonii, Ckn. & Allan.

South Is. Mt. Maungatua, Powder Hill, Flagstaff, Swampy Hill.

"closely allied to A. colensoi, but is distinguished by its constant glaucous colour, thinner linear-laceolata leaves, with well-marked mid-ribs."

T.N.Z.I. vol. 56, p. 49. Ckn. & Allan.

form not uncommon in many localities, . . .

3. **A. Traversii** *Hook. f. Handb. N.Z. Fl.* (1864) 729.—Stem stout, erect, 1–3 ft. high, 1–2 in. diam. at the base, grooved, purplish below. Radical leaves numerous, 6–30 in. long, pinnate; leaflets 2–4 pairs, 4–15 in. long, $\frac{1}{6}$–$\frac{1}{2}$ in. broad, narrow-linear, pungent-pointed, coriaceous, striate, conspicuously transversely articulate, margins smooth or nearly so; petioles 4–10 in. long, sheaths broad, terminated by 2 short spines above. Bracts with a broad rather membranous sheath tipped with a simple or 3-fid leaflet; lobes hardly pungent. Umbels very numerous, solitary or two together in the axils of the bracts; males on peduncles 1–5 in. long, forming a rather open panicle; females on much shorter stalks and inflorescence much more dense. Flowers often polygamous. Fruit narrow linear-oblong, $\frac{2}{5}$ in. long; carpels one 4-winged and the other 3-winged. Vittae 1–2 in the interspaces and 3–5 on the commissural face.—*T. Kirk Students' Fl.* (1899) 208; *Cheesem. Man. N.Z. Fl.* (1906) 210. Gingidium Traversii *F. Muell. Veg. Chath. Is.* (1864) 18.

Chatham Islands: *H. H. Travers, G. Mair, F. A. D. Cox!* *Taramea.* November–December.

Closely allied to *A. Colensoi*, from which it principally differs in the less rigid and transversely jointed leaf-segments, thinner and scarcely pungent bracts, and narrower fruit.

4. **A. intermedia** *Petrie in Trans. N.Z. Inst.* xliv (1912) 180.—Stems erect, 15–24 in. high, stout, often 1 in. diam. at the base, strongly grooved. Radical leaves numerous, 9–15 in. long, 2–3-pinnate; pinnae 4–6 pairs; ultimate leaflets crowded, narrow-linear, $\frac{1}{8}$–$\frac{1}{6}$ in. broad, rigid and coriaceous, grooved, gradually narrowed into spinous points; margins thickened, minutely erose. Sheaths broad, produced at the top on each side into a long rarely pinnately divided spinous point. Inflorescence a narrow-oblong

E. Forming large or small, simple or branched masses 4–12 in. diam. Leaves excessively rigid and coriaceous, pungent, smooth and polished. Umbels forming a terminal globose head.

Leaves very densely imbricating, 4–8 in. long, pinnately divided into 2–4 pairs of closely

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bracts; male inflorescence much more lax than the female. Bracts with broad sheaths and a 3–5-partite limb, the middle segment much the longest, not refracted. Flowers white; calyx-teeth obsolete. Fruit oblong, $\frac{1}{4}$–$\frac{1}{3}$ in. long; carpels usually one 4-winged the other 3-winged, but sometimes both 4-winged or both 3-winged. Vittae 2–4 in the interspaces and 5–6 on the commissural face.—*Lindsay Contr. N.Z. Bot.* (1868) 49, t. 1; *T. Kirk Students' Fl.* (1899) 207; *Cheesem. Man. N.Z. Fl.* (1906) 208. A. squarrosa *var. b* latifolia *Hook. f. Fl. Nov. Zel.* i (1853) 88.

Var. **conspicua** *T. Kirk l.c.*—Leaf-segments not so rigid, with a broad orange or red midrib. Bracts bright-orange, often pinnately divided.

Var. **maxima** *T. Kirk l.c.*—Taller and stouter, 4–10 ft. high or even more, 2–4 in. diam. at the base. Leaves 1½–5 ft. long; segments ¾ in. broad or even more, still more rigid and pungent. Peduncles and pedicels longer. Fruit larger, $\frac{2}{5}$ in. long.

North and South Islands: Common in mountain districts from the East Cape to Southland; most abundant between 1000–3000 ft., but ascending to nearly 5000 ft., and occasionally coming down to sea-level. Var. *conspicua:* North Island: Locality not stated, *Herb. Colenso!* Ruahine Mountains, *W. F. Howlett!* South Island: Wangapeka, *Kingsley;* Mount Murchison, *W. Townson!* Upper Waimakariri, *Cockayne! T. F. C.* Var. *maxima:* Mountain districts from Nelson to Otago, not uncommon. *Taramea; Spaniard.* December–January.

By far the finest species of the genus; easily distinguished from all others by the large size and broad leaf-segments. The two varieties described above have a very distinct appearance, but the differences are hardly of specific value. At the Broken River, Canterbury, I have measured a specimen of var. *maxima* nearly 13 ft. high.

2. **A. squarrosa** *Forst. Char. Gen.* (1776) 136, t. 38.—Stem tall, stout, erect, 2–6 ft. high, 2–4 in. diam. below, deeply grooved, surrounded at the base by the numerous spreading spinous-pointed leaves. Radical leaves 1–3 ft. long, 2–3-pinnate; ultimate leaflets crowded, 6–12 in. long or more, very narrow-linear, $\frac{1}{6}$–$\frac{1}{8}$ in. broad, coriaceous and rigid, deeply striate,

A. leighii Allan. T. 69 (1940) 270.

gradually narrowed into rigid spinous points, margins rough with minute serrulations; sheaths broad, produced above on each side into a long pinnately divided spinous leaflet. Inflorescence a dense spike-like panicle composed of numerous umbels almost concealed in the axils of spinous bracts; female inflorescence much more contracted than the male. Bracts with a broad linear-oblong sheath tipped with 3–5 long rigid spines, the middle one much the longest and usually sharply refracted when the fruit is mature. Fruit oblong, $\frac{1}{4}$–$\frac{1}{3}$ in. long; carpels usually one with 4 wings, the other with 3. Vittae 2–3 in the interspaces and 4–6 on the commissural face.—*Hook. Ic. Plant.* (1844) tt. 607, 608; *Hook. f. Fl. Nov. Zel.* i (1853) 87; *Handb. N.Z. Fl.* (1864) 92; *T. Kirk Students' Fl.* (1899) 207; *Cheesem. Man. N.Z. Fl.* (1906) 209. Ligusticum aciphylla *Spreng. in Schultes Syst. Veg.* 554; *A. Rich. Fl. Nouv. Zel.* (1832) 274; *A. Cunn. Precur.* (1838) n. 505; *Raoul Choix* (1846) 46.

Murray Syst. Veg. Ed. 14. 1784.

North and South Islands: Not uncommon in mountain districts from the East Cape, Mount Egmont, and Ruapehu southwards to Foveaux Strait. Usually between 1000 and 3500 ft., but descends to sea-level in several localities. *Taramea; Kurikuri; Spear-grass.* November–January.

The very narrow leaflets and numerous bracts with long and narrow spinous segments, the middle one of which is sharply refracted, easily distinguish this from all the forms of *A. Colensoi*. Both species yield an aromatic gum resin, which was formerly used by the Maoris as a masticatory. Mr. Petrie gives the name of *robusta* to a stout form not uncommon in many localities, but the differences appear to me to be trivial.

3. **A. Traversii** *Hook. f. Handb. N.Z. Fl.* (1864) 729.—Stem stout, erect, 1–3 ft. high, 1–2 in. diam. at the base, grooved, purplish below. Radical leaves numerous, 6–30 in. long, pinnate; leaflets 2–4 pairs, 4–15 in. long, $\frac{1}{6}$–$\frac{1}{2}$ in. broad, narrow-linear, pungent-pointed, coriaceous, striate, conspicuously transversely articulate, margins smooth or nearly so; petioles 4–10 in. long, sheaths broad, terminated by 2 short spines above. Bracts with a broad rather membranous sheath tipped with a simple or 3-fid leaflet; lobes hardly pungent. Umbels very numerous, solitary or two together in the axils of the bracts; males on peduncles 1–5 in. long, forming a rather open panicle; females on much shorter stalks and inflorescence much more dense. Flowers often polygamous. Fruit narrow linear-oblong, $\frac{2}{5}$ in. long; carpels one 4-winged and the other 3-winged. Vittae 1–2 in the interspaces and 3–5 on the commissural face.—*T. Kirk Students' Fl.* (1899) 208; *Cheesem. Man. N.Z. Fl.* (1906) 210. Gingidium Traversii *F. Muell. Veg. Chath. Is.* (1864) 18.

Chatham Islands: *H. H. Travers, G. Mair, F. A. D. Cox!* *Taramea.* November–December.

Closely allied to *A. Colensoi*, from which it principally differs in the less rigid and transversely jointed leaf-segments, thinner and scarcely pungent bracts, and narrower fruit.

4. **A. intermedia** *Petrie in Trans. N.Z. Inst.* xliv (1912) 180.—Stems erect, 15–24 in. high, stout, often 1 in. diam. at the base, strongly grooved. Radical leaves numerous, 9–15 in. long, 2–3-pinnate; pinnae 4–6 pairs; ultimate leaflets crowded, narrow-linear, $\frac{1}{8}$–$\frac{1}{6}$ in. broad, rigid and coriaceous, grooved, gradually narrowed into spinous points; margins thickened, minutely erose. Sheaths broad, produced at the top on each side into a long rarely pinnately divided spinous point. Inflorescence a narrow-oblong

closely branched panicle 6–15 in. long; bracts many, crowded, erect, the lower pinnately divided, the upper almost entire. Fruit linear-oblong, 5-ribbed on each face.—A. oreophila *Petrie l.c.*

North Island: Wellington—Mount Holdsworth, *W. Townson! Petrie! B. C. Aston!* Mount Hector, *Petrie! B. C. Aston!* 3500–4500 ft. December–January.

Probably *A. Colensoi* is the nearest ally of this species. It differs from *A. Monroi*, with which it has been compared, in the taller and stouter stem, and in the narrower male inflorescence.

5. **A. indurata** *Cheesem. in Trans. N.Z. Inst.* xlvii (1915) 40.—Root long, stout, tapering, often as thick as the thumb at the top. Stem stout, erect, 1¼–2 ft. high, ¼–⅓ in. diameter or more at the base. Radical leaves numerous, 1–1½ ft. long, pinnate with most of the pinnae trifoliolate or rarely the lowest again pinnate, the uppermost usually simple; pinnae 4–6 pairs, 3–6 in. long; ultimate segments 2–5 in. long, ⅙–⅓ in. broad, linear, occasionally squarrose but not conspicuously so, flat or slightly concave, very rigid and coriaceous, gradually narrowed into long rigid and pungent points; midrib very stout, scaberulous above; margins much thickened, cartilaginous, rough with minute serrulations. Petiole equalling or shorter than the blade, upper portion rigid and concave, below broader and sheathing and less coriaceous. Bracts very numerous, rigid, squarrose and spreading; the lower ones with a sheathing base ¼–⅓ in. broad, tipped with a pinnate leaflet 1–2 in. long; upper gradually becoming smaller with narrower and more pungent segments; uppermost tipped with a trifid leaflet 1–1½ in. long, the segments very narrow-linear and spinous. Inflorescence compact, narrow linear-oblong, 8–12 in. long, female slightly narrower than the male. Umbels very numerous compound, more or less concealed within the sheathing bracts. Fruit linear-oblong, not seen in a perfectly mature state.

South Island: Nelson—Mount Lyell and the Brunner Range, Mount Bovis (Paparoa Range), *W. Townson!* Altitudinal range 3000–5000 ft. December–February. A. Colensoi Townsoni Cheesem. T. 39: 410.

So far, this species has only been gathered by Mr. Townson in the localities quoted above. It is clearly allied to *A. Hookeri*, but is a much larger and more rigid and coriaceous plant, with the ultimate segments many times longer and considerably broader, and not conspicuously squarrose. The inflorescence is also much larger and broader, and altogether the aspect of the plant is very dissimilar. Mr. Townson's specimens from Mount Bovis are smaller, and the ultimate segments of the leaves are shorter, showing a slight approach to *A. Hookeri*.

6. **A. Hookeri** *T. Kirk Students' Fl.* (1899) 209.—Erect, 4–12 in. high. Root long, stout, fusiform. Radical leaves numerous, often curved outwards at the tip, 2–8 in. long, pinnate or 2-pinnate; primary leaflets 2–5 pairs, crowded or rather remote, ½–1½ in. long, simple or forked or trifid or pinnately divided; segments ¼–¾ in. long, linear, spreading or squarrose, flat, grooved above, rigid and coriaceous, narrowed into a spinous point. Petiole more than ½ the length of the blade, weak and flaccid below, with a long narrow membranous sheath produced into two short spines at the top. Male scape short, leafy below; bracts numerous, with long membranous sheaths and pinnately divided rigid acicular tips, the lowest sometimes 3 in. long. Umbels numerous, compound, on slender peduncles equalling or shorter than the bract-sheath; rays unequal. Female umbels much smaller, densely packed, forming a narrow contracted panicle; bracts much shorter. Fruit linear-oblong, ⅕ in. long; carpels 4–5-ribbed.—*Cheesem. Man. N.Z. Fl.* (1906) 210; *Ill. N.Z. Fl.* i (1914) t. 61.

South Island: Nelson—Mountains near the source of the Heaphy River, *J. Dall!* Mount Faraday, Mount Buckland, and other peaks of the Brunner and Paparoa Mountains, *W. Townson!* 2500–4500 ft. December–February.

A very singular and distinct species. It can be recognized at a glance by the short flat squarrose ultimate segments of the leaf, which are flat or concave above, but keeled beneath, and which give the tips of the leaves a curious trifid appearance quite foreign to the rest of the genus.

7. **A. Lyallii** *Hook. f. Handb. N.Z. Fl.* (1864) 92.—Stems stout, erect, leafy, 1–2 ft. high or more, $\frac{1}{3}$–$\frac{2}{3}$ in. diam., strongly grooved. Leaves numerous, erect, variable in size, 9–18 in. long, pinnate with 1–4 pairs of pinnae and a terminal one, very rarely bipinnate at the base; leaflets 3–9 in. long, variable in width, $\frac{1}{10}$–$\frac{1}{5}$ in. broad, rigid and coriaceous, gradually narrowed into a long acuminate pungent point, striate, midrib canaliculate; margins minutely and regularly crenulate. Petiole as long as or longer than the lamina; sheath shorter than the petiole, broad and membranous at the base, produced above into 2 long and narrow rigid subulate points. Inflorescence long and narrow, stout and rigid, 5–12 in. long, $1\frac{1}{2}$–4 in. broad including the bracts; males more lax and slender than the females, which are often exceedingly dense and compact. Bracts with broad membranous sheaths tipped with 3–5 rigid and spinous leaflets, the middle one of which is frequently spreading. Male umbels on slender peduncles 1–3 in. long; female on much shorter peduncles, almost concealed in the sheaths of the bracts. Fruit narrow-oblong, $\frac{1}{5}$ in. long; carpels 4–5-winged. Vittae 1–2 in the interspaces, 2–4 on the commissural face.—*T. Kirk Students' Fl.* (1899) 209; *Hemsley in Hook. Ic. Plant.* (1899) t. 2556; *Cheesem. Man. N.Z. Fl.* (1906) 211.

South Island: Canterbury—Rangitata Mountains and Ashburnham Glacier, *Haast;* Mount Ollivier and the Sealey Range, *T. F. C., Petrie!* Otago—Humboldt Mountains, *Cockayne!* Mount Ida, *Petrie! H. J. Matthews!* Lake Harris and Routeburn, *Cockayne! W. E. Thomson!* Clinton Valley, *Cockayne;* Haast Pass and Makaroro, *Poppelwell;* Lake Hauroko, *Crosby Smith;* Dusky Sound, *Lyall.* 3500–5500 ft. December–February.

Until *A. Lyallii* is collected in Dusky Sound, where it was originally gathered by Lyall, it must remain a doubtful matter whether the plant described above is that to which the name of *Lyallii* should be applied. Our plant is much more closely allied to *A. crenulata* than any other; but is much larger and stouter, with a stem sometimes nearly 1 in. diam. at the base; the leaves are more rigid and coriaceous, and the inflorescence is much larger and more dense, with more rigid and coriaceous bracts.

8. **A. crenulata** *J. B. Armstrong in N.Z. Country Journ.* (1879) 56.—Tall, slender, erect, smooth and shining, 1–2 ft. high, pinnate or 2-pinnate at the base, less rigid and coriaceous than is usual in the genus, sometimes almost flaccid; leaflets 1–4 pairs, spreading, 2–6 in. long, $\frac{1}{10}$–$\frac{1}{5}$ in. broad, linear, striate, acuminate and pungent-pointed; midrib often bright-red; margins thickened, finely and regularly crenulate; sheaths short and broad, membranous at the base, produced at the top into 2 slender spines. Panicle variable in length, 4–15 in. long, densely many-flowered. Bracts very numerous, spreading or suberect; sheath often membranous, ending in a long slender central spine and 2 short lateral ones. Male inflorescence much broader and more open than the female; umbels springing from the axils of the bracts, compound; peduncles and rays long and slender. Female inflorescence narrower and more rigid, umbels on shorter peduncles, crowded in the axils of the bracts. Fruit linear-oblong, 4–5-winged.—

J. B. Armstrong in Trans. N.Z. Inst. xiii (1881) 336; *T. Kirk Students' Fl.* (1899) 208. A. Lyallii *var.* crenulata *Cheesem. Man. N.Z. Fl.* (1906) 211.

South Island: Nelson—Mount Arthur Plateau, *T. F. C.*; Mount Owen, *W. Townson.* Canterbury—Waimakariri Glacier, *J. D. Enys, T. Kirk, T. F. C.*, Hill's Peak, *Cockayne!* mountains above Arthur's Pass, *T. F. C.*; Browning's Pass, *Haast*; Upper Rakaia Valley, *J. B. Armstrong*; Sealey Range, Mount Cook district, *T. F. C.* 2500–5000 ft. December–February.

Near to *A. Lyallii*, from which it is separated by the slender and more flaccid habit, more leafy panicle, and longer leaf-segments.

9. **A. Townsoni** *Cheesem. Man. N.Z. Fl.* (1906) 1138.—Erect, slender, smooth and grassy, often somewhat flaccid, 6–12 in. high. Radical leaves numerous, very slender, 3–9 in. long, pinnate or bipinnate at the base; leaflets 2–4 pairs, very narrow, $\frac{1}{2}$–3 in. long, $\frac{1}{30}$–$\frac{1}{20}$ in. broad, usually flaccid but tipped by a short spinous point; margins minutely crenulate; petioles long, with broad membranous sheathing bases. Scape short, leafy; bracts very numerous, usually more rigid than the leaves, with broad membranous sheathing bases and a trifoliolate or pinnately divided lamina. Male umbels numerous, compound, on long slender spreading peduncles; females much fewer and smaller, on shorter erect peduncles, almost concealed in the broad membranous bract-sheaths. Fruit linear-oblong, about $\frac{1}{5}$ in. long; carpels 3–5-winged.—*Ill. N.Z. Fl.* i (1914) t. 62.

T. 71 (1941) 89.

South Island: Nelson—Mount Faraday, Mount Buckland, and the Lyell Mountains, alt. 3000–4500 ft., *W. Townson!* December–February.

The nearest ally of this species appears to be *A. Lyallii*. But it is amply distinct in the much more slender and more flaccid habit, and in the extremely narrow leaf-segments, which do not exceed $\frac{1}{20}$ in. diam. and in some cases are even narrower. No other species of *Aciphylla*, in fact, has such narrow leaves.

10. **A. similis** *Cheesem. in Trans. N.Z. Inst.* xlvii (1915) 42.—Stout, smooth, simple, 6–15 in. high. Leaves 10–20, outer spreading, inner suberect, 3–10 in. long, regularly pinnate, never bipinnate at the base; leaflets 4–10 pairs, 1–3 in. long, $\frac{1}{6}$–$\frac{1}{4}$ in. broad, narrow-linear, rigid, flat, striate, narrowed at the apex into a short pungent point; midrib usually evident; margins thickened and cartilaginous; sheaths smooth, flattened, furnished at the top with a rigid spine on each side $\frac{1}{2}$–1 in. long. Peduncle or flowering stem considerably exceeding the leaves, rather stout. Male inflorescence of numerous compound umbels forming an open panicle, 2–5 in. long; bracts with broad sheathing bases tipped with a small pinnate leaf. Rays of the primary umbels 8–15, $\frac{1}{4}$–$\frac{1}{2}$ in. long; of the secondary umbels about the same number. Flowers white. Fruit about $\frac{1}{5}$ in. long, linear-oblong. Carpels 3–5-winged.

South Island: Mountains of Canterbury, Westland, and Otago, probably not uncommon, but distribution of the species somewhat uncertain, on account of its having been confounded with *A. Monroi*. Peaty bogs on Arthur's Pass, and near the Waimakariri Glacier, *T. F. C.*; Upper Rakaia Valley, *J. D. Enys!* summit of the Griffin Range, Teremakau Valley, *P. G. Morgan!* Mount Dick, near Kingston, *Cockayne!* Garvie Mountains, *Poppelwell!* The Remarkables, near Lake Wakatipu, *J. Speden!* Lorn Peak, Hector Mountains, *Cockayne!* 3000–5000 ft.

This differs from *A. Monroi* in the leaves never being bipinnate, which they often are in *A. Monroi*; in the leaflets being longer and broader and flatter; in the stouter peduncle or flowering stem; and in the more highly developed and broader sheathing bases of the bracts.

11. **A. Monroi** *Hook. f. Fl. Nov. Zel.* ii (1855) 330.—Stems 4–14 in. high, densely clothed below with the remains of the old leaves, smooth and shining. Radical leaves numerous, 3–9 in. long, lanceolate or oblong-lanceolate, pinnate or bipinnate at the base, leaflets 4–8 pairs; ultimate divisions 1–1½ in. long, $\frac{1}{10}$–$\frac{1}{6}$ in. broad, linear or linear-lanceolate, acuminate, pungent, rigid and coriaceous, striate; margins thickened, cartilaginous; sheaths long and narrow, membranous, with 2 subulate leaflets at the top. Flowering stems 6–9 in. long or more, branched above, bearing numerous compound umbels forming an open panicl . Bracts spreading; sheaths often broad and membranous, tipped by a pinnately divided leaflet. Peduncles of the male umbels ½–2 in. long, females about ½ the length; rays numerous, slender, spreading; involucral bracts linear. Fruit $\frac{1}{6}$ in. long, linear-oblong; carpels 5-winged or rarely 4-winged. Vittae 1–2 in the interspaces, 2–4 on the commissural face.—*Handb. N.Z. Fl.* (1864) 93 (*in part*); *T. Kirk Students' Fl.* (1899) 210; *Cheesem. Man. N.Z. Fl.* (1906) 212; *Ill. N.Z. Fl.* i (1914) t. 63.

South Island: Apparently abundant in mountain districts from Nelson and Marlborough southwards to Otago. 3000–6000 ft. December–February.

The original description of this species, published in the second volume of the "Flora Novae-Zelandiae" (p. 330), is much more correct than the later one given in the Handbook, which, I am informed by Mr. Hemsley, included several plants not really belonging to the species. Munro's type was discovered in 1853 in the Awatere Valley, Marlborough, on the "summit of Macrae's Run, alt. 4500 ft." With the assistance of Mr. Hemsley, I have figured it in the "Illustrations of the New Zealand Flora" (t. 63). It will be noticed that the leaves are sparingly bipinnate at the base, which I find to be characteristic of the great majority of the specimens gathered by myself in various localities in Nelson and Canterbury, although sometimes depauperated states from high altitudes are simply pinnate.

12. **A. polita** *Cheesem. in Man. N.Z. Fl.* (1906) 213.—Stems erect, 3–12 in. high, clothed at the base with the sheaths of the old leaves. Radical leaves numerous, very slender, firm but hardly coriaceous, 2–6 in. long or more, 2–3-pinnate; primary divisions 4–6 pairs; ultimate segments very narrow-linear, almost capillary, not more than $\frac{1}{30}$ in. broad, mucronate but hardly pungent; petiole as long as the blade, sheath broad, membranous, produced at the tip into 2 almost filiform leaflets. Umbels compound, forming a loose open panicle, female slightly more contracted than the male. Bracts with a broad sheathing base, tipped with a pinnately divided leaflet. Male peduncles ½–1½ in. long, female ⅓–¾ in.; involucral bracts subulate-lanceolate. Pedicels short. Flowers white. Fruit narrow-oblong, not seen fully ripe, about $\frac{1}{8}$ in. long.—Ligusticum politum *T. Kirk Students' Fl.* (1899) 202.

South Island: Nelson—Mount Duppa, *J. H. Macmahon!* Ben Nevis, Mount Rintoul, Mount Starveall, and Mount Lima, *F. G. Gibbs! Bryant, Kingsley!* Mount Arthur Plateau and Mount Peel, *T. F. C.;* Mount Lockett, *F. G. Gibbs!* 3000–5500 ft. December–January.

Very closely allied to *A. Monroi*, but much more slender, and with less coriaceous almost membranous leaves, which are much more finely divided, the segments being sometimes nearly capillary. Mr. Kirk referred it to *Ligusticum* in the "Students' Flora," but it must certainly remain in the neighbourhood of *A. Monroi*.

13. **A. divisa** *Cheesem. in Trans. N.Z. Inst.* liv (1923) 568.—Stems 6–18 in. high, densely clothed below with the remains of the old leaves, smooth and shining, perfectly glabrous in all its parts. Leaves very numerous, variable in size, 4–15 in. in total length; lamina 2–4 in., obovate

or obovate-cuneate when spread out, 3-pinnatisect; primary divisions 4–5 pairs, suberect, closely placed, often overlapping; ultimate segments linear, ½–1½ in. long, $\frac{1}{10}$–⅛ in. broad, rigid and coriaceous, gradually tapering into an acuminate pungent point, jointed at the base, striate, midrib canaliculate; margins thickened. Petiole as long as the lamina, stout, smooth and convex on the back, deeply concave in front. Sheaths equalling the petiole in length, much expanded and membranous at the base, deeply grooved, narrowed towards the top, and produced on each side into a long slender spine. Flowering stem exceeding the leaves, tall, stout, often ⅓ in. diam. or more, grooved, naked. Male and female inflorescence much alike in size and shape, forming a globose head 2–4 in. diam. Lower bracts often forming a kind of involucel at the base of the panicle; sheaths large, broad and membranous, tipped with 3 long subulate spines. Peduncles of the male umbels ½–2 in. long, females about ½ the length; rays numerous, spreading, slender; involucral bracts linear. Fruit ⅙ in. long, linear-oblong, carpels equally 5-winged, or one 5-winged and the other 4-winged.—A. Monroi *var.* divisa *Cheesem. in Trans. N.Z. Inst.* xlvii (1915) 40.

South Island: Probably not uncommon in the higher mountain districts of Canterbury and Otago. Mount Cook district, abundant on the mountains flanking the Hooker and Tasman Valleys, *T. F. C., Cockayne! Petrie! A. Wall!* Otago—Mountains near Lake Wakatipu, *J. Speden! W. E. Thomson!* Garvie Mountains, *Poppelwell!* Mount Bonpland, *Petrie;* mountains above Lake Harris, *Cockayne!* 3500–5500 ft. December–February.

In my "Notes on *Aciphylla*" (Trans. N.Z. Inst. xlvii (1915) 42) I treated this as a variety of *A. Monroi.* But further study of the genus has convinced me that the differences between it and the original type of the species (which I have figured in the "Illustrations of the New Zealand Flora") are far too great to allow such a course to be taken. The many plants included by Hooker in the Handbook under the name "*Monroi*" are, in my opinion, best treated as follows: 1. Leaves simply pinnate: *A. similis.* 2. Leaves sparingly bipinnate at the base: *A. Monroi* (type of the species). 3. Leaves 3-pinnatisect, ultimate segments linear: *A. divisa.* 4. Leaves pinnatisect, ultimate segments almost filiform: *A. multisecta.*

14. **A. multisecta** *Cheesem. in Trans. N.Z. Inst.* xlvii (1915) 43.—Densely tufted, stout and rigid, forming clumps 9 in. diameter and 9–14 in. high. Rootstock stout, sometimes divided above, clothed at the top with the remains of the old leaves. Leaves very numerous, 20–40 or even more, densely crowded, suberect, 5–9 in. in total length; lamina 2½–4 in. long, obovate-cuneate when spread out, rigid and coriaceous, tripinnatisect; primary divisions 4–6 pairs, suberect, closely placed and partly overlapping; secondary similar but smaller and fewer; ultimate divisions very narrow-linear, 1–1½ in. long, $\frac{1}{30}$ in. broad, coriaceous, striate, narrowed into a short pungent point. Petiole as long or longer than the lamina, very stout and rigid, smooth and convex on the back, deeply concave in front, with the margins much thickened and rounded. Sheaths 1½–2 in. long, ¾–1 in. broad at the base, ⅓ in. broad at the top, rigid and coriaceous above, gradually becoming thin and membranous towards the base, on each side at the top produced into a stiff and rigid pungent-pointed spine 1–1¾ in. long. Female inflorescence alone seen. Peduncle exceeding the leaves, very thick and stout, ⅓–½ in. diameter, grooved, bearing towards the top numerous compound umbels forming a dense globose panicle 3–3½ in. diameter. Lower bracts 2–2¼ in. long, composed of a broad and thin membranous sheath ½ in. across tipped with a pinnatisect leaflet 1 in. long or more. Primary umbels 6–8, peduncles 1–1½ in.

long; secondary umbels 6–10, bracteoles linear, undivided. Fruit $\frac{1}{6}$–$\frac{1}{5}$ in. long, linear-oblong; carpels equally 5-winged or one 4-winged and the other 5-winged.

SOUTH ISLAND: Otago—Rocky places on the lower slopes of Mount Balloon, between Lake Te Anau and Milford Sound, alt. 3500–4500 ft., *F. G. Gibbs!*

This naturally falls into the neighbourhood of *A. divisa*, but is easily distinguished from that plant by its stouter and more rigid and coriaceous habit, by the much more finely divided leaves, with stouter rigid petioles, and by the stouter peduncle and more compact panicle.

15. **A. trifoliolata** *Petrie in Trans. N.Z. Inst.* xlviii (1916) 186.—Stout, erect, perfectly glabrous, 8–15 in. high. Leaves numerous, all radical, 6–8 in. long, usually trifoliolate, more rarely pinnate with 2 pairs of pinnae and a terminal leaflet, very rarely unifoliolate; leaflets 3–6 in. long, $\frac{1}{6}$–$\frac{1}{4}$ in. broad, linear-lanceolate, narrowed upwards into an acuminate sharply pungent point, rigid and coriaceous, strongly grooved, midrib deeply channelled; margins minutely and irregularly crenulate. Sheaths narrow, equalling the petiole in length, gradually expanded towards the base and becoming more membranous, produced at the top into 2 long subulate spines. Flowering stem much exceeding the leaves, stout, naked, strongly grooved. Male inflorescence 5–8 in. long, linear-lanceolate; bracts very numerous, the sheaths linear-oblong, terminating in a long acicular spine with 2 short lateral ones; umbels numerous, seated on a stout peduncle springing from the axil of the bract. Female inflorescence broader and more compact, broadly oblong; bracts larger and more closely packed, more erect; umbels on shorter peduncles, concealed within the bracts. Ripe fruit not seen.

SOUTH ISLAND: Nelson—Rocky spurs on Mount Lyell, alt. 4000 ft., *W. Townson!*

This has somewhat of the habit of *A. Lyallii*, but differs altogether in the trifoliolate leaves. I have seen no specimens except those gathered by Mr. Townson.

16. **A. Cuthbertiana** *Petrie in Trans. N.Z. Inst.* xlvii (1915) 48.—Stems tufted, slender, strict, erect, perfectly glabrous, 6–18 in. high, strongly grooved towards the base. Root long and tapering, fleshy, sometimes as thick as the finger. Leaves variable in length, 6–14 in.; petiole very long, 4–10 in.; sheath thin and membranous and much expanded at the base, gradually narrowed above, and ending in 2 short subulate spines. Lamina usually trifoliolate, more rarely pinnate with 2 distant pairs of leaflets, very rarely unifoliolate; leaflets 2–5 in. long, narrow-linear, striate, distantly articulated, coriaceous, concave above, rounded beneath, gradually narrowed into an acuminate pungent point; margins strongly thickened. Male inflorescence rather lax, linear-oblong, 3–6 in. long; peduncles stout, bearing numerous compound umbels; lower bracts consisting of a large broad sheath tipped with a small trifoliolate pungent-pointed leaflet; upper bracts narrower, simple, long acuminate. Female inflorescence shorter and broader, involucral bracts more closely placed, erect, overlapping; sheaths broader, much inflated, almost concealing the flowers and fruit, terminated by a pungent-pointed leaflet with 2 short subulate spines at the base. Fruit narrow-oblong; carpels 4–5-winged.

SOUTH ISLAND: Mountains of south-west Otago, Fiord County—The Hump, *J. Crosby Smith! J. Speden!* End Peak, *J. Crosby Smith;* Mount Cleughearn, *J. Crosby Smith, J. Cuthbert.* Altitude 3500–4500 ft.

A very distinct species, quite unlike any other.

17. **A. pinnatifida** *Petrie in Trans. N.Z. Inst.* xliii (1911) 254.—Rhizome branched, creeping in wet ground, putting up numerous short flowering stems. Leaves many, all radicle, 4–8 in. long, more or less flaccid, quite glabrous, 3-foliolate; primary divisions divergent, the middle one the longest, deeply and regularly pinnatisect; segments narrow-linear, remote, decreasing in length regularly from the base to the summit, quite entire, midrib and margins thickened, apex acuminate, subpungent. Flowering stems short, often not exceeding the leaves. Bracts large for the size of the plant; sheaths more than ½ the length of the bract, broad, smooth, inflated, concealing the inflorescence; tip of sheath crowned with a short sessile trifoliolate leaflet similar to the leaves but smaller. Male inflorescence more lax than the female, with the sheaths of the involucral bracts much narrower, and not so much inflated. Umbels compound; primary peduncles exceeding the sheaths. Fruit linear-oblong; carpels 3–5-winged.

SOUTH ISLAND: Mountains of south-west Otago—End Peak, and The Hump, near Lake Hauroko, *J. Crosby Smith! J. Speden!* 3000–3500 ft.

Although very different in habit and appearance, the nearest ally of this curious plant is undoubtedly *A. Cuthbertiana*, of which it has the very distinctive inflorescence.

18. **A. Hectori** *Buch. in Trans. N.Z. Inst.* xiv (1882) 346, t. 27.—Stem 10–16 in. high, stout, deeply grooved. Leaves numerous, 3–6 in. long, trifoliolate or rarely pinnate with 2 pairs of leaflets; leaflets 1½–4 in. long, ⅙–⅕ in. broad, narrow-linear, suddenly narrowed into a spinous point, smooth, rigid and coriaceous, striate; margins thickened, entire or serrulate; sheaths long, narrow, produced at the top into 2 very long leaflets almost equalling the leaves proper. Inflorescence forming a contracted spike-like panicle 2–5 in. long. Male umbels on slender peduncles; female on much shorter ones, crowded in the axils of the bracts. Bracts with long narrow sheaths and 3 narrow spinous leaflets. Carpels linear-oblong, 3–5-winged.—*Cheesem. Man. N.Z. Fl.* (1906) 211.

SOUTH ISLAND: Otago—Hector's Col, near Mount Aspiring, *Buchanan;* Mount Kyeburn, *H. J. Matthews!* 4000–5000 ft.

Mr. Kirk reduced this to *A. Lyallii* in the "Students' Flora," but it differs from that species in the trifoliolate leaves, and in the leaflets at the top of the leaf-sheath being almost as long as the leaves proper, whereas they do not reach the base of the lowest pinnule in *A. Lyallii*.

19. **A. Kirkii** *Buch. in Trans. N.Z. Inst.* xix (1887) 214, t. 17.—Stout, erect, smooth and polished, 6–12 in. high. Leaves all radical, yellowish-brown, 4–9 in. long, ¼–½ in. broad or more, simple or forked or 3-foliolate, excessively thick and coriaceous, suddenly narrowed into a short spinous point, finely striate, striae often connected by irregular cross-veinlets; margins much thickened; sheath short and narrow, membranous, grooved, jointed at its junction with the blade. Flowering stem short, stout, grooved, naked below. Bracts very numerous, the lower ones 3-foliolate, pungent-pointed; the upper often simple, all rigid and coriaceous. Male umbels shortly pedunculate; females almost sessile in the axils of the bracts. Fruit linear-oblong, ⅕ in. long, carpels 4–5-winged. Vittae 1–2 in the interspaces, 4 on the commissural face.—*T. Kirk Students' Fl.* (1899) 209; *Cheesem. Man. N.Z. Fl.* (1906) 212.

SOUTH ISLAND: Otago—Mount Alta, *Buchanan!* Hector Mountains and hill near Mount Aspiring, *Petrie!* The Remarkables, near Lake Wakatipu, *J. Speden!*

Remarkable for its excessively rigid and coriaceous habit, broad flat leaves with narrow membranous sheaths, and compact panicle with rigid erect bracts.

20. **A. Traillii** *T. Kirk in Trans. N.Z. Inst.* xvi (1884) 371.—Small, tufted, perfectly glabrous, 3–8 in. high, somewhat flaccid when fresh. Leaves 2–5 in. long or more, usually 3-foliolate, but sometimes quite simple, rarely pinnate with 2 pairs of leaflets and a terminal one; leaflets 1–3 in. long., $\frac{1}{12}$–$\frac{1}{8}$ in. broad, narrow-linear, pungent-pointed, rigid and coriaceous when dry, striate, margins thickened; sheath narrow, membranous. Flowering stem slender, often flexuous. Bracts simple or trifoliolate, pungent-pointed. Male umbels distant or crowded, on short or long peduncles; females much smaller, concealed in the inflated sheaths of the bracts. Fruit linear-oblong, $\frac{1}{10}$–$\frac{1}{8}$ in. long; carpels 5-ribbed. Vittae 1 or rarely 2 in the interspaces, 2 or 4 on the commissural face.—*Students' Fl.* (1899) 210; *Cheesem. Man. N.Z. Fl.* (1906) 211.

Var. **cartilaginea** *Cheesem.*—Leaves with broad yellow canaliculate midribs and much thickened yellow margins.—A. cartilaginea *Petrie in Trans. N.Z. Inst.* xlvii (1915) 47.

STEWART ISLAND: Mount Anglem and Mount Rakiahua, *T. Kirk!* Var. *cartilaginea:* Mount Rakiahua, *Goyen, Petrie!* Fraser Peaks, *F. R. Chapman, Thomson, Petrie!* 2500–3500 ft.

Combined with Petrie's *A. cartilaginea*, this forms a distinct species. Mr. Kirk considered it to be "nearly allied to *A. Lyallii*," but it is far removed from my conception of that plant.

21. **A. Poppelwelli** *Petrie in Trans. N.Z. Inst.* liii (1921) 369.—Small, densely tufted at the base, often forming fair-sized clumps. Leaves numerous, densely crowded at the base of the stem, 2–5 in. long, usually 3-foliolate, but in small specimens frequently simple, and in larger ones occasionally bearing 2 pairs of leaflets with a terminal one; leaflets $1\frac{1}{2}$–4 in. long, $\frac{1}{12}$–$\frac{1}{4}$ in. wide, narrow-linear, narrowed upwards into a pungent point, thick and coriaceous, striate, margins much thickened; petiole short; sheath longer than the petiole, membranous. Flowering stems as long as or longer than the leaves, stout for the size of the plant; inflorescence a dense oblong spike $1\frac{1}{2}$–4 in. long; bracts very numerous, densely crowded, 3-foliolate, leaflets rigid, pungent-pointed, often reddish-orange. Umbels shortly stalked, densely compacted within the axils of the bracts. Fruit not seen quite ripe, linear-oblong.

Var. **major** *Petrie l.c.*—Flowering stem much longer and stouter, far exceeding the leaves.

SOUTH ISLAND: Otago—Mount Kyeburn, *Petrie!* Rock and Pillar Range, *B. C. Aston! A. Wall;* Garvie Mountains, *Poppelwell! J. Speden! W. E. Thomson! Cockayne.* Var. *major:* Mount Ida Range, *Petrie!* 3000–4500 ft.

Very closely allied to *A. Traillii*, principally differing in the straight (not flexuous) flowering stem, far more numerous bracts, smaller and more compactly arranged umbels, and in the much more coriaceous habit.

22. **A. congesta** *Cheesem. in Trans. N.Z. Inst.* xlvii (1915) 44.—Forming large hemispherical simple or branched masses 6–12 in. diameter; root-stock often as thick as the thumb, branched at the top. Leaves very numerous, 40–50 or more, all radical and crowded round the base of the

flowering stem, the inner erect, the outer spreading, 4–8 in. in total length; lamina 2–4 in. long, pinnately divided into 2–4 pairs of leaflets with a terminal one, internodes short but evident; leaflets $\frac{1}{6}$–$\frac{1}{4}$ in. broad, linear, straight or curved, rigid and coriaceous, narrowed at the apex into a short rigid and pungent point; midrib stout; margins thick and cartilaginous; veins parallel with the midrib, but connected by transverse veinlets. Petiole or sheath usually longer than the blade, very thick and coriaceous at the top, and there $\frac{1}{2}$ in. diameter, gradually becoming membranous and broader at the base, where it is often 1–$1\frac{1}{4}$ in. across; stipules sometimes nearly as long as the leaf but usually much shorter, adnate with the petiole to the top, and so placed as to be close together on the inner face of the petiole. Peduncle or flowering stem stout, $\frac{1}{2}$–$\frac{2}{3}$ in. diameter, about 6–12 in. high, bearing at the top a globose head 4–5 in. across of closely placed compound umbels. Lower bracts $1\frac{1}{2}$–2 in. long; sheathing portion broad and membranous, tipped by a short pinnate leaflet. Primary umbels 6–12, secondary very numerous. Fruit linear-oblong, $\frac{1}{6}$–$\frac{1}{5}$ in. long; carpels 4–5-winged.

T. 71 (1941) 89.

South Island: Otago—Rocky places on the lower slopes of Mount Balloon, between Lake Te Anau and Milford Sound, alt. 3500–4500 ft., *F. G. Gibbs!*

Closely allied to *A. Spedeni*, but much larger and more robust. It differs also in the leaves being pinnate with evident internodes between the pairs of leaflets, not flabellate with the segments spreading from one level as in *A. Spedeni*.

23. **A. Spedeni** *Cheesem. in Trans. N.Z. Inst.* xlv (1913) 93.—Apparently forming large simple or branched masses 4–12 in. diameter or more; rootstock thick and woody, branched at the top. Leaves very numerous, 40–60 or more, crowded, spreading, the lower curved downwards, the upper more erect, 4–6 in. long, flabellately divided into 6–9 leaflets springing from the top of the petiole; petiole rather more than $\frac{1}{2}$ the length of the whole leaf, very thick and coriaceous at the top and about $\frac{1}{3}$–$\frac{1}{2}$ in. broad, flat above, convex beneath, gradually widening and becoming thinner and more membranous towards the base, where it is $\frac{3}{4}$–$1\frac{1}{2}$ in. broad. Leaflets usually 7, but sometimes the central one is 2- or 3-fid almost to the base, thus making the number 8 or 9, very rarely 5 or 6, very thick, rigid and coriaceous, $2\frac{1}{2}$–3 in. long, $\frac{1}{10}$–$\frac{1}{6}$ in. broad, narrow-linear, narrowed towards the apex into a short rigid and pungent point; midrib and margin thick and cartilaginous; veins parallel with the midrib, but connected by numerous transverse veinlets. Male inflorescence alone seen; flowering stem or peduncle stout, nearly $\frac{1}{2}$ in. diameter, 3–4 in. high, bearing at the top numerous compound umbels congested into a capitate mass 3 in. diameter. Lower bracts $1\frac{1}{2}$ in. long, composed of a broad and thin membranous sheath $\frac{1}{2}$–$\frac{3}{4}$ in. diameter, tipped by 7–8 short linear leaflets. Primary umbels 10–12, peduncles $\frac{1}{2}$–1 in. long; secondary umbels very numerous, bractlets wanting. Flowers white; calyx-teeth short, triangular; petals obovate-spathulate, with a rather long claw. Fruit not seen.

South Island: Otago—Eyre Mountains, near Lake Wakatipu, rocky places on Cecil Peak, and other high peaks in the vicinity, *J. Speden.* 5000–6000 ft. January–February.

T. 71 (1941) 89.

A very distinct and curious species. It is no doubt related to *A. Dobsoni*, but differs widely in the much greater size of all its parts, in the remarkable digitately or flabellately divided leaves which are not nearly so coriaceous as those of *A. Dobsoni*, and in the much larger and more massive inflorescence.

24. **A. Dobsoni** *Hook. f. Handb. N.Z. Fl.* (1864) 93.—Stout, smooth and shining, forming compact yellowish-brown patches 3–9 in. diam. Rootstock thick and woody, branched at the top. Leaves all radical, very numerous, densely imbricated, excessively thick and coriaceous, 1½–4 in. long; sheaths ½–1½ in. or more, ¾ in. broad; leaflets 3 at the top of the sheath, about equal, 1–2 in. long, ⅓ in. broad at the base, linear-subulate or dagger-shaped, rigid, concave, transversely jointed, keeled at the back towards the top, pungent-pointed. Flowering stem very stout, almost as thick as the little finger, grooved. Umbels 4–5, clustered at the top of the stem, forming a capitate inflorescence; peduncles short, thick. Fruiting-umbels densely packed, forming a rounded head 1 in. in diam. or more. Fruit linear-oblong, ⅛ in. long; carpels 4–5-winged, but not seen quite ripe.—*T. Kirk Students' Fl.* (1899) 210; *Cheesem. Man. N.Z. Fl.* (1906) 213.

South Island: Canterbury—Summit of Liebig Range, *J. C. Andersen;* Mount Dobson, *Dobson* and *Haast, T. F. C.;* mountains above Lake Ohau, *Buchanan!* Otago—Near Lake Hawea, *Haast;* Mount Jones, *Cockayne;* Mount St. Bathan's, *Petrie!* The Remarkables, near Lake Wakatipu, *W. E. Thomson!* 5000–6500 ft. December–February. T. 71 (1941) 88.

Usually found on shingle-slopes. A most remarkable plant, nowhere plentiful, and seldom seen in flower or fruit.

25. **A. simplex** *Petrie in Trans. N.Z. Inst.* xxii (1890) 440.—Very similar to *A. Dobsoni*, and with precisely the same habit, but differing in the leaves, which are quite entire, 1½–4 in. long; lower ½ gradually expanded into a broad rounded sheath, which is thin and membranous at the base, with the surface covered with numerous parallel ribs, and which is sometimes as much as ½ in. diam.; blade linear-subulate, rigid and coriaceous, concave above, rounded beneath, tip obtuse with a very short pungent mucro, more or less transversely jointed and often longitudinally grooved, midrib usually evident, margins thickened. Flowering stem stout, slightly exceeding the leaves; umbels 4–6, peduncles variable in length, ½–1 in.; bracts 4–6, oblong-lanceolate, acute; secondary umbels ⅓–½ in. diam., globose; flowers densely packed. Ripe fruit not seen.—*T. Kirk Students' Fl.* (1899) 211; *Cheesem. Man. N.Z. Fl.* (1906) 214.

South Island: Otago—Mounts Pisa and Cardrona and the Hector Mountains, *Petrie!* Garvie Mountains, *Poppelwell!* The Remarkables, near Lake Wakatipu, *J. Speden!* 5000–6000 ft. December–February. T. 71 (1941) 88.

11. **COXELLA** Cheesem. and Hemsl. Kew Bull 1911.

A glabrous perennial herb. Leaves pinnately decompound; segments linear, flat, flaccid, not spinescent. Umbels compound, axillary, stalked, arranged in a panicle. Involucral bracts few, small, narrow-lanceolate. Flowers white. Calyx-teeth somewhat prominent. Petals broad, with a short inflexed point. Fruit broadly oblong, dorsally compressed, equally 5-winged; wings broad, thin, membranous. Carpels one 3-winged, the other 2-winged. Vittae large, 1 or 2 in the interspaces, and 2 or 3 on the commissural face. Carpophore 2-partite.

A very remarkable plant, which has been placed by turns in the genera *Gingidium*, *Ligusticum* (or *Anisotome*), *Angelica*, and *Aciphylla*. From *Anisotome* it differs markedly in the flattened and conspicuously winged fruit, one carpel being 3-winged and the other 2-winged, or very rarely both carpels may be 3-winged. From *Angelica* it is

separated by the equally winged fruit, in the smaller number of wings (or ribs) and in the number being unequal in the two carpels. It has much of the habit of *Aciphylla*, although the leaves and bracts are never spinescent, but differs in the flattened and winged carpels, and in the smaller number of wings (or ribs) to each carpel, to say nothing of the much larger vittae.

The name *Coxella* is used to commemorate the services to botanical science of the late Mr. F. A. D. Cox, of Whangamarino, Chatham Islands. During a lengthened residence in this outlying corner of the Dominion Mr. Cox regularly and consistently collected specimens of the flora of the islands, making many important discoveries.

1. **C. Dieffenbachii** *Cheesem. and Hemsl. ex Cheesem. Trans. N.Z. Inst.* xliv (1912) 160.—Stem stout, erect, 2–3 ft. high, 1–1½ in. diam. at the base, grooved. Leaves all radical, 1–2 ft. long, 4–8 in. broad, flaccid, greyish-green, 3–4-pinnate; petiole usually more than ½ the length, sheath with two blunt lobes at the top; blade oblong or ovate-oblong in outline; primary pinnae 4–5 pairs; segments 1½–3 in. long, $\frac{1}{10}$ in. broad, linear, flat, striate, mucronate. Inflorescence broad, loosely paniculate, of numerous pedunculate compound umbels. Bracts with a broad sheath and rather large pinnatisect lamina. Peduncles 2–5 in. long; rays of the male umbels numerous, slender, of the females about 6; involucral bracts few, linear-subulate. Fruit large, ⅝ in. long, ⅜ in. broad, broadly oblong, much dorsally compressed; carpels one 3-winged and the other 2-winged, rarely both 3-winged. Vittae 1 or 2 in each interspace and 2 or 3 on the commissural face.—*Ill. N.Z. Fl.* i (1914) t. 64. Ligusticum Dieffenbachii *Hook. f. Handb. N.Z. Fl.* (1867) 729. Gingidium Dieffenbachii *F. Muell. Veg. Chath. Is.* (1864) 17, t. 1. Angelica Dieffenbachii *Benth. and Hook. Gen. Plant.* i (1867) 916. Aciphylla Dieffenbachii *T. Kirk Students' Fl.* (1899) 211; *Cheesem. Man. N.Z. Fl.* (1906) 214. Kew Bull 1911 (4) 188.

Chatham Islands: Once not uncommon on cliffs by the seashore; now exceedingly rare, and apparently confined to a few stations on the precipitous cliffs of the southern portion of the islands, *H. H. Travers! F. A. D. Cox! Captain Dorrien Smith!*

In an interesting paper prepared by Captain Dorrien Smith, entitled "An Attempt to introduce *Olearia semi-dentata* into the British Islands," published in the Kew Bulletin for 1910 (pp. 120–26), which contains much information of value respecting the vegetation of the Chatham Islands, Captain Dorrien Smith gives an account of a visit to the only known locality for *Coxella*, near the south end of the main island. This is accompanied by an excellent photograph of the plant in its natural habitat.

T. H3. 367.

12. **ANISOTOME** Hook. f. 1854.

Large or small, perfectly glabrous, more or less aromatic, frequently succulent herbaceous plants. Leaves 1–3-pinnate or decompound; rhachis articulated at the insertion of the leaflets. Umbels compound, rarely simple, usually of many rays; involucral bracts few or many, long or short, rarely wanting. Flowers white or red, polygamous or dioecious. Calyx-teeth small or obsolete, usually unequal. Petals incurved at the tip. Stamens incurved. Fruit linear-oblong; carpels rounded or dorsally compressed, each with 5 equal narrowly winged ridges, or one carpel 5–4-winged, the other 4–3-winged. Vittae seldom more than 1 to each interspace, usually 2 on the commissural face.

The genus *Anisotome* was originally founded by Hooker to include the Auckland and Campbell Islands *A. latifolia* and *A. antipoda*, two very distinct and remarkable species. In the "Flora Novae-Zelandiae" he enlarged its scope so as to take in *A. intermedia* and *A. aromatica*. He also included all the true *Angelicae* then known from New Zealand. In the Handbook he restored the *Angelicae* to their proper genus, but reduced the whole of the remaining species to the northern genus *Ligusticum*. In

the "Genera Plantarum" Bentham transferred the whole of the species from *Ligusticum* to *Aciphylla*, which course was shortly afterwards adopted by Cockayne. In my memoir on the "Botany of the Subantarctic Islands," published in 1909, I suggested (p. 408) "that if it be considered necessary to limit *Ligusticum* to the species found in the Northern Hemisphere (and there is much to be said in favour of such a course), then it would be far more preferable to revive Hooker's genus *Anisotome* for the reception of the New Zealand species than to transfer them to *Aciphylla*, particularly as the habit of the true *Aciphyllae*, with their rigid and coriaceous spinous leaves, and paniculate inflorescence with spinous bracts, is most distinct, and certainly appears to justify their separation as a distinct genus, which would really be as well characterized as many genera of *Umbelliferae* accepted by most botanists." Since then, on the initiative of Cockayne and Laing, most New Zealand botanists have accepted this view. The reconstituted genus *Anisotome* will therefore include 20 species from the New Zealand area, and possibly 2 others from Australia. It chiefly differs from *Ligusticum* in the narrower fruit with the ribs often unequal in height, and in the fewer vittae.

A. Leaves 2–3-pinnate or decompound.

* Tall, stout, leafy, 2–4 ft. high or more.

Very tall and stout, 3–6 ft. Leaves 2-pinnate; leaflets ovate-oblong, decurrent at the base; lobes pungent .. .. 1. *A. latifolia.*
Robust, 2–4 ft. Leaves 2–3-pinnate; ultimate segments linear-subulate, pungent .. .. 2. *A. antipoda.*
Stems 3–5 ft., without milky juice. Leaves 3-pinnate; leaflets ovate; lobes acute; petioles with a hooded ligule .. .. 3. *A. acutifolia.*
Stems 1–2 ft., with milky juice. Leaves 2–3-pinnate; leaflets ovate, cuneate at the base; lobes broad, obtuse; petioles without a ligule .. .. 4. *A. intermedia.*
Stems 1½–2½ ft. Leaves 2–3-pinnate; leaflets oblong, cut into narrow obtuse lobes .. .. 5. *A. Lyallii.*
Stems 1–2 ft. Leaves 2–4-pinnate; leaflets cut into narrow-linear piliferous lobes. Styles slender .. .. 6. *A. Haastii.*
Stems seldom over 12 in. Leaves 2–4-pinnate; leaflets linear-filiform, with flexuous hair-points .. .. 7. *A. capillifolia.*

** Small, 4–15 in. high, rarely taller.

Slender, 5–15 in. Leaves flaccid, 2-pinnate; leaflets cut into filiform hair-pointed lobes. Styles short .. .. .. 8. *A. brevistylis.*
Stout, 5–15 in. Leaves coriaceous, 2–3-pinnate; leaflets cut into linear rigid and pungent lobes .. .. 9. *A. dissecta.*
Very slender, 5–15 in. Leaves membranous, 2–3-ternately divided; leaflets few, flat, linear or filiform, acute .. .. .. 10. *A. filifolia.*
Stout, 2–6 in. Leaves deltoid, membranous, 2-ternately divided; leaflets cuneate-deltoid, deeply incised .. .. .. 11. *A. deltoidea.*
Stout, thick and fleshy, 3–6 in. Leaves few, 2–3-ternately divided; involucral bracts like the leaves, very large, overtopping the umbel .. .. 12. *A. carnosula.*
Stout, thick and fleshy, 3–6 in. Leaves few, 2–3-ternately divided; involucral bracts 4–6, linear, entire or rarely forked, shorter than the umbel .. .. 13. *A. diversifolia.*
Slender, spreading, 6–12 in. Leaves 1–2-pinnate; leaflets distant, cut into narrow-linear acute lobes. Umbels simple, 6–10-flowered 14. *A. patula.*

B. Leaves pinnate or 3-foliolate.

Stout, 8–24 in. Leaflets 8–24 in., large, toothed or lobed; lobes piliferous .. .. 15. *A. pilifera.*
Small, 2–6 in. Leaflets 4–8 pairs, remote, ovate-deltoid, deeply incised. Flowering stems unbranched. Styles long, recurved .. 16. *A. petraea.*
Slender, 2–12 in. Leaflets small, orbicular or flabellate, toothed or incised .. .. 17. *A. aromatica.*
Small, densely tufted, 1–3 in. Leaves imbricated; leaflets palmately 3–6-lobed, bristle-pointed .. .. 18. *A. imbricata.*
Stout, depressed, 3–4 in. Leaflets glaucous, ovate, sharply toothed or lobed .. .. 19. *A. Enysii.*
Minute, ½–2 in. Leaflets 1–2 pairs, flabellate, entire or obscurely crenate .. .. 20. *A. flabellata.*

1. **A. latifolia** *Hook. f. Fl. Antarct.* i (1844) 16, t. 8.—Tall, stout, erect, coriaceous, 3–6 ft. high or more. Stem frequently 3–4 in. diam. at the base, grooved. Radical leaves 1–2 ft. long, coriaceous, deep shining green; petioles long, ¾–1 in. diam., broadly sheathing at the base; blade ovate in outline, 2-pinnate: primary divisions 2–6 in. long, linear-oblong; secondary obliquely ovate-oblong with broad decurrent bases, unequally 3–5-lobed; lobes acuminate, with acicular points and thickened margins; veins reticulate. Bracts very large, with broad concave bases 2–3 in. diam., and smaller foliaceous tips. Umbels numerous, compound, 2–3 in. diam., dioecious or polygamous; involucral bracts linear, acute. Flowers red. Fruit ⅙ in. long; carpels with 5 ridges, rarely with 4 or 3; vittae solitary under each furrow.—Calosciadium latifolium *Endl. ex Walp. Ann.* ii (1850) 702. Liqusticum latifolium *Hook. f. Handb. N.Z. Fl.* (1864) 94; *T. Kirk Students' Fl.* (1899) 200; *Cheesem. Man. N.Z. Fl.* (1906) 215; *Subantarct. Is. of N.Z.* ii (1909) 408.

Var. **angustatum** *T. Kirk l.c.*—Ultimate segments of the leaves narrower, ¼ in. wide or less, acicular points longer.

Auckland and Campbell Islands: Abundant in moist places throughout the group. December–January.

A noble species, said to occasionally reach the height of 6–8 ft.

2. **A. antipoda** *Hook. f. Fl. Antarct.* i (1844) 17, tt. 9, 10.—Stems 2–4 ft. high, very stout, deeply furrowed. Leaves 1–2 ft. long, coriaceous; petiole as thick as the thumb, sheathing at the base; blade oblong, 2–3-pinnate; ultimate segments very numerous, rigid, crowded, 1 in. long, $\frac{1}{15}$–$\frac{1}{12}$ in. broad, linear-subulate, pungent-pointed. Bracts smaller and narrower than in *A. latifolia.* Umbels numerous, compound, 2 in. diam., dioecious or polygamous; involucral bracts narrow-linear. Flowers red. Fruit ¼ in. long, narrow-oblong; carpels one with 5 wings, the other 3-winged.—Calosciadium antipodum *Endl. ex Walp. Ann.* ii (1850) 702. Ligusticum antipodum *Homb. and Jacq. ex Dcne. Bot. Voy. Astrol. et Zel.* (1853) 63, t. 3; *Hook. f. Handb. N.Z. Fl.* (1864) 94; *T. Kirk Students' Fl.* (1899) 200; *Cheesem. Man. N.Z. Fl.* (1906) 216; *Subantarct. Is. of N.Z.* ii (1909) 408.

Auckland and Campbell Islands, Antipodes Island: Abundant throughout the group, *Hooker, T. Kirk!* and all subsequent collectors. December–January.

Almost as fine a plant as the preceding, which is its nearest ally, and from which it is easily separated by the finely divided leaves with numerous linear segments.

3. **A. acutifolia** *Cockayne* (*N.Z. Plants and their Story*) (1919) 135.—Stems 3–5 ft. high, stout, deeply furrowed; rootstock as thick as the wrist. Leaves spreading, 2 ft. long or more, 6–9 in. broad, oblong or ovate-oblong, 3-pinnate; segments broad, acute, sharply toothed; petiole stout, finely grooved, the upper part of the sheath free, forming a ligule. Flowers not seen. Fruiting-umbels 2–2½ in. diam., dense, compound; rays numerous, about 1 in. long. Fruit ⅕ in. long, exceeding the pedicels; carpels one 5-winged, the other 3-winged.—Ligusticum acutifolium *T. Kirk in Journ. Bot.* (1891) 237; *Students' Fl.* (1899) 201; *Cheesem. Man. N.Z. Fl.* (1906) 216. Aciphylla acutifolia *Cockayne in Subantarct. Is. of N.Z.* i (1909) 198 (*name only*).

A. haastii × uliginosa TNZI. 59:727.

THE SNARES: Rare and local, *T. Kirk! Cockayne!*

This must be considered one of the rarest plants of the Dominion. Mr. Kirk states that it was only seen in one place, at an altitude of about 350 ft.; and only one plant was noticed during the expedition of 1907. It is closely allied to *A. intermedia*, of which it is doubtless a recent derivate form. Its chief differential characters, according to Kirk, are the total absence of the viscid milky juice so evident in *A. intermedia*; in the upper part of the sheath at the base of the petiole being free, forming a hooded ligule; in the more acute segments of the leaves; and in the smaller umbels and shorter fruits. I have seen specimens of the foliage only.

4. **A. intermedia** *Hook. f. Fl. Nov. Zel.* i (1853) 89.—Stems rather stout, 6–24 in. high, abounding in viscid milky juice. Leaves 6–20 in. long; petiole long, stout, sheathing at the base, with narrow membranous wings; blade coriaceous, oblong to ovate-oblong, 2–3-pinnate; primary divisions 5–8 pairs, 2–4 in. long; leaflets $\frac{1}{2}$–$1\frac{1}{4}$ in. long, rather broad, ovate-triangular, cuneate at the base, sessile or shortly stalked, unequally cut to the middle or below it into broad-linear obtuse or subacute lobes. Umbels few or many, $1\frac{1}{2}$–2 in. diam., compound, polygamous or dioecious; involucral bracts linear-lanceolate. Flowers white. Fruit $\frac{1}{4}$–$\frac{1}{3}$ in. long, linear-oblong; carpels with 5 narrow wings, or one with 5 and the other with 4 wings.—Ligusticum intermedium *Hook. f. Handb. N.Z. Fl.* (1864) 94; *T. Kirk Students' Fl.* (1899) 201; *Cheesem. Man. N.Z. Fl.* (1906) 217. T. 45: 280.

Var. **oblongifolium** *T. Kirk l.c.* — Leaves narrower, linear-oblong, seldom more than 2 in. broad; segments more numerous, crowded, narrow-linear, subacute.

SOUTH ISLAND: Sounds of the south-west coast of Otago, from Martin's Bay and Big Bay to Preservation Inlet and Puysegur Point, *Lyall, Buchanan! T. Kirk! Thomson!* south-east coast at Catlin's River and The Nuggets, *Petrie!* Waikawa, *Cockayne;* Breaksea Island, Codfish Island, and Long Island, *Poppelwell!* South and western coasts of STEWART ISLAND, not uncommon, *T. Kirk! Cockayne.* THE SOLANDERS: *Cockayne.* Var. *oblongifolium:* Inland base of the Ruggedy Range, *T. Kirk!*

5. **A. Lyallii** *Hook. f. Fl. Nov. Zel.* i (1853) 88.—Usually taller and stouter than *A. intermedia.* Stem $1\frac{1}{2}$–$2\frac{1}{2}$ ft. high, 1–2 in. diam. at the base, purplish, obscurely grooved. Leaves 1–2 ft. long, linear-oblong, 2–3-pinnate; primary divisions 6–10 pairs, 1–4 in. long, linear-oblong; leaflets crowded, 1 in. long, oblong-cuneate, cut to the base into linear obtuse lobes $\frac{1}{12}$ in. broad. Umbels numerous at the top of the stem, compound, many-flowered; involucral bracts linear. Fruit $\frac{1}{4}$–$\frac{1}{3}$ in. long, linear-oblong, longer than its pedicel; carpels much as in *A. intermedia.*—Ligusticum Lyallii *Hook. f. Handb. N.Z. Fl.* (1864) 95; *T. Kirk Students' Fl.* (1899) 201; *Cheesem. Man. N.Z. Fl.* (1906) 217. T. 46: 27.

SOUTH ISLAND: Sounds of the south-west coast, *Lyall, Hector* and *Buchanan! Thomson!* December–January.

This only differs from *A. intermedia* in the slightly larger size and more finely divided leaves, and might well be regarded as a variety.

(T. v. m. 2 Hooch)

6. **A. Haastii** *Cockayne and R. M. Laing in Trans. N.Z. Inst.* xliii (1911) 366.—Dark-green, very aromatic. Root stout, tapering, as thick as the finger. Stems 1–2 ft. high, rather stout, purplish, grooved. Radical leaves 6–20 in. long; petioles long, grooved, sheathing at the base; blade linear-oblong to ovate-oblong, membranous, 2–4-pinnate; primary divisions 8–12 pairs, the lower smaller and remote; leaflets $\frac{1}{2}$–$\frac{3}{4}$ in. long, deeply cut into numerous crowded linear lobes $\frac{1}{4}$–$\frac{1}{2}$ in. long, $\frac{1}{30}$–$\frac{1}{25}$ in. wide, with short or long hair-like points. Cauline leaves or bracts much smaller, with very

broad inflated sheathing petioles. Umbels dioecious, usually numerous, 1–2 in. diam., compound, the lower ones on long peduncles, forming a terminal open panicle; involucral leaves linear-subulate, shorter than the rays. Flowers white. Fruit ovoid-oblong, $\frac{1}{5}$–$\frac{1}{4}$ in. long; carpels 5-winged.—Ligusticum Haastii *F. Muell. ex Hook. f. Handb. N.Z. Fl.* (1864) 95; *T. Kirk Students' Fl.* (1899) 201; *Cheesem. Man. N.Z. Fl.* (1906) 217; *Ill. N.Z. Fl.* i (1914) t. 65.

South Island: Abundant in the central and western portions of the Southern Alps, stretching from Mokihinui and the Mount Rochfort Range on the one side and the Spenser Mountains on the other to the extreme south-west of Otago. Attains its northern limit on Mount Stokes, near Pelorus Sound, but as a rule it is rare in the north-eastern portion of the South Island. Altitudinal range 1500–5000 ft. December–February.

A handsome and graceful plant, easily recognized by the finely divided dark-green membranous leaves, with hair-pointed lobes.

7. **A. capillifolia** (Cheesem.) *Cockayne N.Z. Plants and their Story* (1919) 191.—Bright-green, leafy, rather stout, 6–9 in. high. Roots long, stout, stringy. Leaves numerous at the base of the stem, 4–6 in. long, 1–2 in. broad; petioles short, grooved, broadly sheathing at the base; blade linear-oblong in outline, membranous, 2–4-pinnately divided, primary divisions or pinnae 8–12, the lower remote, the upper often overlapping, $\frac{1}{3}$–1 in. long, deeply and finely again divided; ultimate segments about $\frac{1}{4}$ in. long, very narrow, often under $\frac{1}{40}$ in. broad, terminating in a long flexuous hair-point. Cauline leaves absent; the flowering stems not much exceeding the leaves. Umbels few, 1–4, compound, in an open-branched panicle; a broad sheathing bract tipped with a short finely divided lamina at the base of each division; primary rays 8–15; involucral bracts linear-subulate, shorter than the rays. Flowers white. Fruit ovoid-oblong, $\frac{1}{5}$ in. long. Carpels usually one 5-winged and the other 4-winged; vittae 1–2 in the interspaces and 2–4 on the commissural face.—Ligusticum capillifolium *Cheesem. in Trans. N.Z. Inst.* xlvii (1915) 45.

South Island: Mountains of south-west Otago, alt. 3000–5500 ft. Mountains above Chalky Inlet, *A. Reischek!* Mount Tyndall, *Petrie!* Mount Bonpland, *H. J. Matthews!* slopes of Mount Balloon, McKinley's Pass, *F. G. Gibbs!* near Lake Harris, *J. Speden!* December–February. T. 71 (1941) 89.

I have been acquainted with this for many years, but have delayed describing it until I could satisfy myself as to its distinctness from *A. Haastii*, to which it is very close indeed. It is, however, a smaller plant, with a flowering stem not much exceeding the leaves; the petioles are much shorter, and the leaves much more finely cut, the ultimate segments being barely half the width of those of *A. Haastii*, and furnished with a long flexuous hair-point at the tip. Mr. Gibbs remarks that "pressed specimens badly represent the growing plant, which closely resembles in appearance a miniature *Todea superba*. The final leaflets are all turned at right angles to the plane of the leaf, giving it a beautiful mossy appearance." The first person to collect the plant appears to have been the late Mr. A. Reischek; but it has since been observed in so many stations that we may fairly conclude that it is not uncommon on the higher mountains of south-west Otago.

8. **A. brevistylis** (Hook. f.) Diels. *Cockayne Veg. N.Z.* (1921) 225.—Stems 6–18 in. high, slender, grooved. Radical leaves 4–12 in. long; petiole somewhat rigid, shortly sheathing at the base; limb linear-oblong in outline, rarely broader and ovate-oblong, 2–3-pinnate; primary divisions 6–10 pairs; leaflets cut down to the rhachis into 3–5 distant very narrow-linear lobes $\frac{1}{4}$–$\frac{1}{3}$ in. long with short acicular tips. Umbels few, 1–8, loosely panicled, compound, dioecious; involucral bracts filiform, shorter than the rays. Fruit on T. 47: 139.

very short pedicels, oblong, $\frac{1}{8}$–$\frac{1}{6}$ in. long; carpels with 5 narrow wings; styles very short.—Ligusticum brevistyle *Hook. f. Handb. N.Z. Fl.* (1864) 95; *T. Kirk Students' Fl.* (1899) 202; *Cheesem. Man. N.Z. Fl.* (1906) 218.

South Island: Canterbury—Upper Waitaki and head of Lake Hawea, *Haast!* Otago – Lake district, *Hector* and *Buchanan!* Kurow, Mount Ida, Cromwell, and other localities in eastern and Central Otago, *Petrie!* Hector Mountains, *W. Wilcox!* Eyre Mountains, Garvie Mountains, Routeburn, *Poppelwell.* Southland — *Crosby Smith.* 1000–3500 ft. December–February.

Closely related to *A. Haastii*, but a much smaller and more slender plant, with more sparingly divided leaves, smaller fruit, and shorter styles.

9. **A. dissecta** *Cockayne Veg. N.Z.* (1921) 223.—Rather stout, coriaceous, 5–15 in. high. Rootstock thick, covered with the ragged bases of the old leaves. Radical leaves 3–12 in. long, coriaceous but hardly rigid; petiole $\frac{1}{2}$ the length or more, with a long and narrow sheath; blade ovate-oblong or ovate-lanceolate, 2–3-pinnate; primary pinnae 4–9 pairs, 1–2 in. long; secondary closely placed, ternately or pinnately cut into numerous linear pungent-pointed segments $\frac{1}{4}$–1 in. long and about $\frac{1}{20}$ in. wide. Umbels compound, few or many in an open branched panicle; primary rays numerous, 10–20; involucral bracts linear or lanceolate, acuminate. Fruit linear-oblong, $\frac{1}{8}$ in. long; carpels 5-winged.—Ligusticum dissectum *T. Kirk Students' Fl.* (1899) 202; *Cheesem. Man. N.Z. Fl.* (1906) 218.

North Island: Mount Holdsworth and other high peaks of the Tararua Range, *Buchanan! T. P. Arnold! W. Townson! B. C. Aston!* Mount Hector, *Petrie! B. C. Aston!* 3500–4500 ft. December–February.

An imperfectly known species, perhaps more nearly allied to *A. pilifera* than to any other, but differing widely in the much more divided leaves.

10. **A. filifolia** *Cockayne and R. M. Laing in Trans. N.Z. Inst.* xliii (1911) 366.—Slender, grassy, very aromatic. Stems 6–20 in. high, smooth, striate, often much branched above. Leaves 4–15 in. long, thin and often flaccid; petioles very long, slender, sheathing at the base, sheaths short and broad, membranous; blade very variable in size and shape, ternately divided into narrow-linear flat acute segments $\frac{1}{2}$–$1\frac{1}{2}$ in. long and varying in width from filiform to $\frac{1}{3}$ in., the broadest sometimes toothed or lobed at the tip. Umbels few, compound, dioecious, on long slender peduncles; rays slender, very unequal, $\frac{1}{2}$–2 in. long; involucral bracts few, short, subulate-lanceolate. Fruit $\frac{1}{3}$ in. long, linear-oblong, compressed; carpels thin, 5-winged, lateral wings broader than the dorsal.—Ligusticum filifolium *Hook. f. Handb. N.Z. Fl.* (1864) 95; *T. Kirk Students' Fl.* (1899) 203; *Cheesem. Man. N.Z. Fl.* (1906) 218.

South Island: Mountain districts from Cook Strait to the south of Canterbury, not uncommon. Usually from 1000 to 4500 ft., but descends almost to sea-level at Kaikoura, *R. M. Laing!* December–January.

11. **A. deltoidea** *Cheesem. n. comb.* — Small, stout, dark-green and shining, very aromatic, 2–6 in. high. Rootstock stout, clothed with pale chaffy scales. Leaves numerous, all radical, membranous, 2–4 in. long; petiole $\frac{1}{2}$ the length, sheathing at the base; blade broadly deltoid in outline, ternately or 2-pinnately divided; leaflets $\frac{1}{5}$–$\frac{1}{3}$ in. long, cuneate-deltoid, deeply 3–5-lobed; lobes flat, very narrow linear-subulate, acute or acuminate. Flowering stems short, seldom exceeding the leaves. Umbels small, $\frac{1}{2}$–1 in. diam., compound; rays 4–8, slender, very unequal; involucral

bracts short, linear-subulate. Flowers white or pink. Fruit linear-oblong, $\frac{1}{4}$ in. long, 5-winged. Ligusticum deltoideum *Cheesem. in Trans. N.Z. Inst.* xiv (1882) 299; *Man. N.Z. Fl.* (1906) 219; *T. Kirk Students' Fl.* (1899) 203.

South Island: Grassy slopes on Mount Arthur, Nelson, altitude 4000–5500 ft., *T. F. C.;* Mount Stokes, Marlborough, *J. H. Macmahon!* Mount Lyell, *W. Townson!* December–January.

Close to *A. filifolia*, but distinguished by the smaller size, more numerous leaves with copious divisions, differently shaped leaflets, and short flowering stems, which rarely exceed the leaves.

12. **A. carnosula** *Cockayne and R. M. Laing in Trans. N.Z. Inst.* xliii (1911) 366.—Small, 3–6 in. high, thick and fleshy, glaucous-green. Root stout, often as thick as the little finger, tortuous among shingle. Stems usually short, tapering downwards. Leaves 1–3 near the top of the stem or from the root, very thick and fleshy; petiole $\frac{1}{2}$–2 in. long, with a short broad sheath; blade 1–3 in. diam., 2–3-ternately multifid, ultimate segments $\frac{1}{4}$–$\frac{2}{3}$ in. long, $\frac{1}{15}$–$\frac{1}{10}$ in. broad, very narrow-linear, acute or subacute, curved, obscurely jointed on the rhachis. Umbel solitary, compound, large for the size of the plant, $1\frac{1}{2}$–4 in. diam; involucral bracts about 5, 2–3-ternately divided like the leaves, overtopping the umbel; rays numerous, rigid, almost woody in fruit, $\frac{1}{2}$–1 in. long. Secondary umbels small, concealed among the bracts of the involucels, which far exceed the small white or pink almost sessile flowers. Calyx-teeth acute, prominent. Styles rigid, subulate. Fruit oblong, $\frac{1}{4}$ in. long; carpels incurved, with 5 low obtuse ridges, commissural face rounded; vittae 1 under each furrow and 2 on the commissure.—Ligusticum carnosulum *Hook. f. Handb. N.Z. Fl.* (1864) 96; *T. Kirk Students' Fl.* (1899) 203; *Cheesem. Man. N.Z. Fl.* (1906) 219; *Ill. N.Z. Fl.* i (1914) t. 66.

South Island: Bare shingle-slopes on the mountains of Nelson, Marlborough, and Canterbury, not common, but easily overlooked. Wairau Gorge, *T. F. C.;* Awatere Mountains, *Cockayne* and *Foweraker;* mountains near Lake Tennyson, *T. F. C., R. M. Laing!* Mount Captain, *T. Kirk!* Mount Torlesse, *Haast! Petrie! T. F. C.;* mountains of the Upper and Middle Waimakariri, *J. D. Enys! Petrie! T. F. C., Cockayne!* Rangitata Valley, *J. B. Armstrong!* Ashburton Mountains, *Cockayne* and *R. M. Laing.* 3000–6000 ft. December–February.

A very remarkable plant, never found away from the moving masses of shingle so largely developed on the eastern slopes of the Southern Alps.

13. **A. diversifolia** *Cockayne in Trans. N.Z. Inst.* xliv (1912) 34.—Habit and size of *A. carnosula*, and like it thick and fleshy and glaucous-green when fresh. Stems 1–4 in. long, tufted at the top of a stout tortuous rootstock, with several radical leaves at the base, and 1–3 cauline ones just below the inflorescence. Leaves as in *A. carnosula*, 2–3-ternately multifid with linear-subulate ultimate segments $\frac{1}{6}$–$\frac{1}{3}$ in. long. Umbels usually solitary, compound, terminating the stem, 1–3 in. diam.; but sometimes smaller simple or compound umbels are developed in the axils of the cauline leaves. Involucral bracts 4–6, linear, flat, acute, quite entire or rarely forked, much shorter than the umbel; rays 6–12, stout, rigid. Secondary umbels small, many-flowered; bracts of the involucels 8–12, linear, quite entire. Flowers crowded, white or pink, much as in *A. carnosula* but rather larger and with more prominent calyx-teeth. Fruit not seen.—Ligusticum diversifolium *Cheesem. Man. N.Z. Fl.* (1906) 1139.

SOUTH ISLAND: Nelson—Shingle-slopes on Mount Robert (overlooking Lake Rotoiti), alt. 4000 ft., *F. G. Gibbs !*

I have been much puzzled with this plant, which has the habit and foliage of *A. carnosula*, but differs markedly in the much smaller linear and entire involucral bracts, and in smaller simple or compound umbels often being developed in the axils of the cauline leaves. In *A. carnosula* the bracts are similar to the leaves—that is, are ternately multifid, and the primary ones far overtop the umbel. There is never more than a single terminal compound umbel, and the stems are usually very short.

14. **A. patula** *Cockayne Veg. N.Z.* (1921) 169.—Slender, greyish-green, 6–12 in. high or more. Stems erect or inclined, branched above, grooved. Radical leaves 2–6 in. long, linear-oblong in outline, pinnate or rarely 2-pinnate; leaflets 4–7 pairs, cut down to the rhachis into narrow-linear acute lobes, which are again toothed or incised at the tips, rarely entire. Cauline leaves smaller, with fewer leaflets and narrower lobes. Umbels small, simple in the very imperfect specimens seen, on slender peduncles, 6–12-flowered; involucral bracts linear, with a broad base, usually shorter than the unequal pedicels. Ripe fruit not seen.—Ligusticum patulum *T. Kirk Students' Fl.* (1899) 203; *Cheesem. Man. N.Z. Fl.* (1906) 220.

SOUTH ISLAND: Canterbury—Limestone cliffs near Burke's Pass, *J. B. Armstrong !* Otago (?)—*Buchanan !*

A very imperfectly known species. As stated in the first edition of this work, there is a fragmentary specimen in Mr. Kirk's herbarium, and another (without locality) in Mr. Buchanan's. The material is far too incomplete to form the basis of a satisfactory diagnosis; and that given above will doubtless require amendment when a good series of specimens is obtained.

15. **A. pilifera** *Cockayne and R. M. Laing in Trans. N.Z. Inst.* xliii (1911) 366.—Stout, erect, glaucous-green, very aromatic. Root thick and tapering. Stem 8–24 in. high or more, sparingly branched above, smooth, striate, purplish below. Leaves 4–16 in. long, very thick and coriaceous; petioles stout, sheathing, sheath long and narrow; blade linear or linear-oblong, pinnate; leaflets 8–12 pairs, $\frac{1}{2}$–1 in. long, sessile, closely placed and often overlapping, deltoid-ovate or deltoid-orbicular, coarsely toothed or 2–3-lobed or pinnatifid; lobes or segments again toothed, tipped with a stout bristle. Umbels 2–4, on stout peduncles towards the top of the stem, 2–3 in. diam., compound, dioecious; rays $\frac{3}{4}$–$1\frac{1}{2}$ in. long, unequal; involucral bracts linear or lanceolate. Flowers white, rather small. Fruit $\frac{1}{6}$ in. long, ovate-oblong; carpels usually 3-winged.—Ligusticum piliferum *Hook. f. Handb. N.Z. Fl.* (1864) 96; *T. Kirk Students' Fl.* (1899) 204; *Cheesem. Man. N.Z. Fl.* (1906) 220; *Ill. N.Z. Fl.* i (1914) t. 67.

Var. **pinnatifida** *T. Kirk l.c.*—Leaflets longer and narrower, not so coriaceous, pinnatifidly cut into narrower lobes.

SOUTH ISLAND: A common mountain-plant from the Mount Arthur Plateau and Mount Stokes to the south-west of Otago. 2500–5000 ft. December–February.

A very distinct species, not closely allied to any other. Its stout fleshy stems, bold foliage, and large umbels of white flowers make it a very conspicuous and showy plant, and a great ornament to the rocky slopes and ledges on which it is usually found.

16. **A. petraea** *Cheesem. n. comb.*—Very aromatic, 2–5 in. high. Root stout, long and tapering, clothed at the top with the bases of the old leaves. Leaves numerous, all radical, spreading, 1–4 in. long, subcoriaceous

or herbaceous, pinnate; petiole from $\frac{1}{2}$ to $\frac{1}{3}$ of the length of the whole leaf, broadly sheathing at the base; leaflets 4–8 pairs, rarely more, $\frac{1}{5}$–$\frac{1}{2}$ in. long, ovate or ovate-deltoid or broadly deltoid in outline, deeply and somewhat sharply incised, sometimes almost pinnate at the base; lobes obtuse or subacute, never hair-pointed. Flowering stems or peduncles many, longer or shorter than the leaves, rather slender, not branched, naked or furnished with a small pinnatifid leaflet about the middle. Umbels compound, $\frac{3}{4}$–$1\frac{1}{2}$ in. diam.; rays 4–8, slender, unequal, $\frac{1}{4}$–$\frac{3}{4}$ in. long.; involucral bracts small, linear; usually with a dilated base. Flowers white; calyx-lobes rather long, acute; styles very long, recurved. Fruit linear-oblong, $\frac{1}{8}$ in. long, not seen quite ripe.—Ligusticum petraeum *Cheesem. in Trans. N.Z. Inst.* li (1919) 92.

South Island: Abundant on the north face of Mount Owen, Nelson, alt. 4000 ft., usually on limestone debris, *T. F. C.* Also on the southern face of the same mountain, *W. Townson!* Broken River, Canterbury Alps, alt. 3500 ft., *T. F. C.*; Takitimu Mountains, Southland, alt. 3500 ft., *Petrie!* December–February.

This has much of the habit and appearance of *Angelica decipiens*, and the two are easily confounded in the absence of fruit. There is also a resemblance to some states of *L. aromaticum*; but in reality it differs in habit, in the spreading leaves with their much more remotely placed pinnae, in the unbranched flowering stems, and particularly in the acute calyx-lobes, and the very long recurved styles. I have been acquainted with it for many years.

17. **A. aromatica** *Hook. f. Fl. Nov. Zel.* i (1853) 89.—Very aromatic, variable in size and habit, usually from 4–12 in. high, but in alpine situations often much dwarfed, matted and depressed, sometimes barely 2 in. high. Root stout, often long and tapering. Stem simple or sparingly branched above. Leaves all radical, numerous, 1–6 in. long, coriaceous or almost membranous; petiole short, stout, broadly sheathing at the base; blade linear, pinnate; leaflets 6–12 pairs, $\frac{1}{5}$–$\frac{1}{2}$ in. long, deltoid-ovate or orbicular or broadly flabellate, more or less toothed or incised, sometimes pinnatifid or even again pinnate; lobes and teeth usually ending in a short or long bristle-like point. Umbels small, dioecious, compound, $\frac{1}{2}$–$1\frac{1}{2}$ in. diam.; males usually longer and more open than the females; rays slender, unequal, $\frac{1}{2}$–2 in. long; involucral bracts few, small, linear-subulate. Fruit linear-oblong, $\frac{1}{8}$ in. long; carpels 5-winged.—Ligusticum aromaticum *Handb. N.Z. Fl.* (1864) 96; *T. Kirk Students' Fl.* (1899) 204; *Cheesem. Man. N.Z. Fl.* (1906) 220. T·43·373.

Var. **incisum** *T. Kirk l.c.*—Larger and more membranous, 12–20 in. high. Leaflets flabellate or rhomboid, 3-partite almost to the base: segments deeply incised, spreading. T·73·160.

Var. **lanuginosum** *T. Kirk l.c.*—Leaf-segments tipped with copious long snow-white hairs, sometimes almost concealing the leaves.

North and South Islands: Abundant in mountain districts from the East Cape to Foveaux Strait. Altitudinal range 1500–6500 ft. November–February. Var. *incisum*: Broken River, Canterbury, *T. Kirk!* Var. *lanuginosum*: Mountains above Lake Tekapo, *T. F. C.*; Hector Mountains, Mount Pisa, Mount Cardrona, and other localities in Central Otago, *Petrie!*

An exceedingly variable species, the various forms of which are much in need of a leisurely and careful revision.

18. **A. imbricata** *Cockayne Veg. N.Z.* (1921) 226.—Small, much branched, densely tufted, forming large flat or convex patches. Stems stout, 1–3 in. long, densely clothed with numerous closely imbricating

coriaceous shining leaves. Leaves ¼–¾ in. long; petioles very short, with large broad membranous sheaths produced upwards into a hooded ligule; blade with a broad flattened rhachis and 4–8 pairs of closely placed often imbricating leaflets; leaflets sessile, palmately 3–6-lobed; lobes terminated by a stout bristle longer than the lobes. Umbels small, simple or compound, sunk among the leaves; involucral bracts few, linear-subulate. Fruit broadly ovoid; carpels 5-winged.—Ligusticum imbricatum *Hook. f. Handb. N.Z. Fl.* (1864) 97; *T. Kirk Students' Fl.* (1899) 205; *Cheesem. Man. N.Z. Fl.* (1906) 221.

South Island: High peaks from the north of Nelson and Marlborough to Southland, not at all uncommon. 4000–6500 ft. January–February.

A very remarkable little plant, easily known by its small size, densely tufted habit, imbricated leaves, short peduncles sunk among the leaves, and broad fruit.

(T.K.)

19. **A. Enysii** *R. M. Laing in Trans. N.Z. Inst.* xliv (1912) 66.—Small, stout, depressed, glaucous-green, seldom more than 4 in. high. Root stout, often very long. Leaves all radical, 1½–3 in. long, spreading or decurved, thick and coriaceous when fresh, linear or linear-oblong, pinnate; leaflets 3–6 pairs, ⅕–⅓ in. long, sessile, ovate or ovate-orbicular, sharply toothed or lobed; lobes again cut, not piliferous; petioles with very broad short sheaths. Flowering stems 2–4 in. long, simple or forked, decumbent. Umbels compound; rays 2–5, slender, spreading, unequal, ¼–¾ in. long; bracts 2–3, connate almost to the tips into a broad cup-shaped involucre. Partial umbels 3–6-flowered. Fruit ovoid, ⅛ in. long; carpels with 5 obscure ridges.—Ligusticum Enysii *T. Kirk in Trans. N.Z. Inst.* ix (1877) 548; *Students' Fl.* (1899) 205; *Cheesem. Man. N.Z. Fl.* (1906) 221.

Var. **Tennysonianum** *R. M. Laing l.c.*—Leaves deltoid-ovate in outline, pinnate with the lower pinnae ternately divided; leaflets less sharply toothed than in the type.

= angelica trifoliatum T. 576 (1947 ICN)

South Island: Canterbury—Limestone shingle in the Broken River basin, *J. D. Enys! T. Kirk! T. F. C.*; Banks Peninsula, *R. M. Laing!* ✓ Otago—Naseby, *Petrie!* Var. *Tennysonianum*: Mount Princess, above Lake Tennyson, *R. M. Laing.* 1200–2700 ft. December–February.

1947 ICN

(T.K.)

20. **A. flabellata** *Cockayne ex Crosby Smith in Trans. N.Z. Inst.* xlvi (1914) 228 (*name only*).—Minute, ½–1½ in. high. Leaves all radical, ¼–1 in. long, coriaceous, linear, pinnate; leaflets 1–3 pairs but sometimes reduced to a single one, ⅕–⅓ in. diam., flabellate or orbicular-rhomboid, rounded at the tip, sessile, entire or minutely sinuate-crenate; margins recurved; petioles rather stout, with broad sheathing bases. Umbels small, compound, on short peduncles rarely exceeding the leaves; rays 3–4; general involucre apparently wanting; partial involucre of 3 broad connate bracts open on one side. Fruit broadly oblong or ovate; carpels 4- or 5-winged, not seen quite ripe.—Ligusticum flabellatum *T. Kirk Students' Fl.* (1899) 205; *Cheesem. Man. N.Z. Fl.* (1906) 222. Aciphylla flabellata *Cockayne in Bot. Surv. Stewart Id.* (1909) 59.

Stewart Island: Crevices in rocks near the South Cape, *T. Kirk!* Mason Bay, *Cockayne!* Not uncommon in rocky places in the south and west of the island, *Cockayne.*

A very curious little plant, nearest to *L. Enysii*, but amply distinct. The 3-lobed partial involucre is quite unlike that of any other New Zealand species.

13. **ANGELICA** Linn.

Perennial herbs, often tall and stout, usually erect, rarely scrambling or subscandent. Leaves pinnate or 2–3-pinnate. Umbels compound, dioecious or polygamous. Calyx-teeth usually obsolete, rarely prominent. Petals incurved at the apex. Fruit ovate or oblong, more or less dorsally flattened with a broad commissure; carpels 5-ribbed, the 2 lateral ribs very broad, forming a wing on each side of the carpel, the 3 dorsal much smaller and narrower. Vittae 1 or 2 in each furrow, rarely more. Seed much dorsally compressed, plane or concave on the inner face.

An ill-defined genus, which, taken in a wide sense, contains from 50 to 60 species, mainly found in North America, Europe, and western Asia. The New Zealand species form a peculiar little group confined to the Dominion, and 2 of them are specially remarkable from their subscandent habit, a character almost unknown in the *Umbelliferae*.

* Herbaceous, erect. Leaves mostly radical.

Tall, stout, 1–2 ft. Leaves pinnate; leaflets many, 1–2 in., crenate	1. *A. montana.*
Slender, 3–6 in. Leaves pinnate; leaflets many, pinnatifid ..	2. *A. decipiens.*
Slender, 3–9 in. Leaves 3-foliolate or pinnate; leaflets 1–2 pairs, rhombeo-orbicular, crenate	3. *A. trifoliolata.*

** Suffruticose, subscandent. Leaves cauline.

Leaves 1-foliolate or 3-foliolate; leaflets small, $\frac{1}{4}$–$\frac{1}{2}$ in. ..	4. *A. geniculata.*
Leaves pinnate; leaflets 2–5 pairs, large, 1–$2\frac{1}{2}$ in.	5. *A. rosaefolia.*

1. **A. montana** *Cockayne in Rep. on Scenery Preservation* (1915) 14.—A stout, erect, highly aromatic herb, 1–2 ft. high. Root thick and fleshy. Stems $\frac{1}{4}$–$\frac{1}{2}$ in. diam. at the base, smooth and striate, sparingly branched above. Radical leaves 6–15 in. long, rather fleshy, glaucous, pinnate; leaflets 5–10 pairs, close together or the lower rather distant, 1–2 in. long, sessile, obliquely ovate or ovate-oblong, obtuse, finely crenate or serrate, rarely lobed, veins finely reticulate; petioles stout, often longer than the blade, sheath narrow. Umbels few, compound, 1–3 in. diam.; rays 10–20, slender, spreading; involucre wanting; partial umbels usually with an involucel of a few linear bracts. Flowers white. Fruit $\frac{1}{5}$ in. long, ovate-cordate; carpels much compressed, with a broad lateral wing on each side, which is produced downwards at the base; dorsal ribs small; vittae 1 in each furrow and 2 on the commissural face.—Gingidium montanum *Forst. Char. Gen.* (1776) 21. Ligusticum Gingidium *Forst. f. Prodr.* (1786) n. 140. Anisotome Gingidium *Hook. f. Fl. Nov. Zel.* i (1853) 89. Angelica Gingidium *Hook. f. Handb. N.Z. Fl.* (1864) 97; *T. Kirk Students' Fl.* (1899) 212; *Cheesem Man. N.Z. Fl.* (1906) 222; *Ill. N.Z. Fl.* i (1914) t. 68.

North and South Islands: From Kawhia and Taupo southwards to Otago; once very abundant, but as it is everywhere greedily eaten by stock it has become scarce in many districts. Sea-level to 4000 ft. *Aniseed.* November–January.

2. **A. decipiens** *Hook. f. Handb. N.Z. Fl.* (1864) 98.—Very aromatic, 3–8 in. high. Root stout, thick and woody. Leaves numerous, spreading, usually all radical, 3–6 in. long, pinnate; leaflets 6–10 pairs, $\frac{1}{4}$–$\frac{1}{2}$ in. long, sessile, ovate or ovate-oblong, membranous or flaccid, irregularly deeply toothed or pinnatifid; lobes linear, acute, not bristle-pointed; petioles shorter than the blade, sheath broad. Flowering stems several, usually

unbranched, equalling or longer than the leaves. Umbels compound, ½–1½ in. diam.; rays 4–8, unequal, ⅓–1 in. long; involucral bracts few, ovate-lanceolate. Flowers small, white. Fruit ⅛ in. long, rounded or slightly cordate at the base; carpels 5-winged, the 2 lateral wings much wider than the 3 dorsal. Vittae 1 under each furrow and 2 on the commissural side.—*Cheesem. Man. N.Z. Fl.* (1906) 223. Aciphylla decipiens *Hook. f. and Benth. Gen. Plant.* i (1867) 916. Ligusticum decipiens *T. Kirk Students' Fl.* (1899) 205.

South Island: Not uncommon in mountain districts from Nelson to Otago. 2000–6000 ft. December–January.

Closely resembling *Anisotome aromatica* in foliage, but the inflorescence and fruit are altogether different. Mr. Kirk refers it to *Ligusticum (= Anisotome)*; but all the fruiting specimens I have seen have the lateral wings of the carpels much wider than the dorsal.

3. **A. trifoliolata** *Cockayne in Trans. N.Z. Inst.* xxxi (1899) 425.—Slender perfectly glabrous, 3–9 in. high; stems creeping and rooting at the base; branches few, spreading. Leaves on rather long slender petioles, 3-foliolate or pinnate; leaflets few, in 1 or 2 distant pairs, simple or again ternately divided; petiolule slender, ½–1½ in. long; blade ½ in., rhombeo-orbicular or flabellate, cuneate at the base, crenate-dentate at the rounded tip, rather membranous, glaucous below; veins reticulated. Umbels small, compound; primary rays few, secondary 3–5; involucral bracts minute, linear. Flowers small, white; styles rather long, slender, spreading. Fruit ¼ in. long, narrow ovate-cordate; carpels compressed, with a broad lateral wing on each side, dorsal ribs narrower but conspicuous. Vittae 1 under each furrow and 2 on the commissural face.—*Cheesem. Man. N.Z. Fl.* (1906) 223. Ligusticum trifoliolatum *Hook. f. Handb. N.Z. Fl.* (1864) 97; *T. Kirk Students' Fl.* (1899) 206.

South Island: Canterbury—Swampy ground by the Kowai River, and in the vicinity of Porter's Pass, *Haast, Cockayne! A. Wall!* 2000–3000 ft.

Apparently a rare and local plant, quite unlike any other species. I have seen very few specimens.

4. **A. geniculata** *Hook. f. Handb. N.Z. Fl.* (1864) 98.—Stems 2–5 ft. long, much branched, scrambling over rocks and shrubs; branches slender, terete, flexuose; internodes 1–3 in. long. Leaves small, alternate, 1-foliolate, of young plants 3-foliolate or 3-lobed; petiole slender, ¼–½ in. long; sheaths broad, produced into 2 blunt lobes at the top; leaflets ¼–½ in. diam., orbicular-ovate or rhomboid or transversely oblong, often cuneate at the base, rounded at the tip, obscurely crenate-dentate, rather thin and membranous, finely reticulate. Umbels small, terminal and lateral, on short peduncles; rays 2–5, very slender, about ⅓ in. long; involucral bracts few, short, linear-subulate. Flowers small, white; petals inflexed at the tips. Fruit ⅕ in. long, oblong-ovoid, cordate at the base; carpels much compressed, the lateral wings very broad, pale and membranous. Vittae 1 under each furrow and 2 on the commissure.—*T. Kirk Students' Fl.* (1899) 213; *Cheesem. Man. N.Z. Fl.* (1906) 224. Anisotome geniculata *Hook. f. Fl. Nov. Zel.* i (1853) 90, t. 19. Peucedanum geniculatum *Forst. f. Prodr.* (1786) n. 136; *A. Rich. Fl. Nouv. Zel.* (1832) 272; *A. Cunn. Precur.* (1838) n. 507. Bowlesia geniculata *Spreng. Umbellif.* 14, t. 5.

North Island: Rare and local. East Cape and interior, *Colenso*; Port Nicholson, *Buchanan!* mouth of the Wainuiomata River, *B. C. Aston!* Paekakariki, *H. B. Kirk.* South Island: Marlborough—Motuaro Island, Queen Charlotte Sound, *J. H. Macmahon!* Nelson—Waiau Valley, *C. E. Christensen.* Canterbury—Vicinity of Culverden and Waimakariri Gorge, *Cockayne*; Banks Peninsula, not uncommon near the sea, *Raoul, T. Kirk! R. M. Laing! Spencer!* Malvern Hills, Broken River, Mount Torlesse, *Cockayne*; gorge of the Rakaia, *H. H. Allan!* Otago—Not rare on the eastern coast, *Buchanan! Petrie!* base of Rock and Pillar Range, *Cockayne.* Sea-level to 1500 ft. December–February.

A very curious little plant, quite unlike any Umbellifer known to me.

5. **A. rosaefolia** *Hook. Ic. Plant.* (1843) t. 581.—Stems 2–5 ft. long, much branched, scrambling over rocks or among bushes, hard and almost woody below, clothed with the persistent sheaths of the old leaves. Leaves cauline, alternate, 2–5 in. long, pinnate; leaflets 2–5 pairs, 1–2½ in. long, opposite, sessile, ovate or ovate-oblong to ovate-lanceolate, often oblique at the base, acute, finely serrate, submembranous or coriaceous, veins reticulated; petiole slender, rigid; sheaths broad, membranous, 2-lobed at the top. Umbels many, terminal and axillary, compound, 1–3 in. diam.; rays numerous, slender; involucral bracts linear or lanceolate. Flowers white. Fruit ⅛ in. long, ovate-cordate; carpels with broad lateral wings. Vittae 1 under each furrow and 2 on the commissural face.—*Hook. f. Handb. N.Z. Fl.* (1864) 98; *T. Kirk Students' Fl.* (1899) 212; *Cheesem. Man. N.Z. Fl.* (1906) 224; *Ill. N.Z. Fl.* i (1914) t. 69. Anisotome rosaefolia *Hook. f. Fl. Nov. Zel.* i (1853) 90.

North Island: Not uncommon on rocky shores from the Three Kings Islands to the East Cape and Raglan: rare inland, and much less abundant farther south. Hawke's Bay, *A. Hamilton! Petrie!* Ruahine Range, *Harding! B. C. Aston!* Kaimanawa Mountains, *B. C. Aston!* Upper Rangitikei, *Buchanan!* South Island: Reported from Akaroa by *Raoul*, but has not been seen of late years. Sea-level to 2000 ft. *Koherika; Kohepiro.* October–November.

This and the preceding species are anomalous in the family from their subscandent stems. The leaflets are furnished with a pair of minute stipellae at the base—one on the upper surface, the other below.

14. **DAUCUS** Linn. 1735

Annual or biennial herbs, usually hispid. Leaves decompound, ultimate segments narrow. Umbels compound; rays numerous; bracts of the general involucre usually pinnatisect. Flowers white. Calyx-teeth small or obsolete. Petals often unequal, inflexed at the tips. Fruit ovoid or oblong, terete or slightly dorsally compressed; carpels convex, with 5 slender bristly primary ribs, and 4 winged secondary ones bearing rows of hooked bristles. Vittae 1 under each secondary rib and 2 on the commissural face. Seed flattened dorsally.

Species about 60, chiefly found in the temperate portions of the Northern Hemisphere, and most abundant in the Mediterranean region. The single New Zealand species is also common in Australia and Tasmania.

D. glochidiatus (Labill) Fischer, Meyer et Avé-Lall. m.-and.

1. **D. brachiatus** *Sieb. in DC. Prodr.* iv (1830) 214.—An erect annual or biennial branching herb, very variable in size, 6–18 in. high, more or less bristly with short stiff hairs, rarely almost glabrous. Leaves flaccid, on long slender petioles, 2–3-pinnate; primary leaflets 4–6 pairs; secondary

See Hegi V 1907—4. Thellung Daucus Studien II Jedale Rep. sp. nov. 1926.

deeply incised or pinnatifid; segments small, linear-oblong, minutely mucronulate. Umbels axillary or terminal, compound; primary rays 4–10, very unequal in size; involucral bracts entire or pinnately divided. Flowers small. Fruit ovoid, about $\frac{1}{8}$ in. long; carpels with the secondary ridges much the largest, and bearing a single row of purplish hooked bristles; primary with a double row of finer bristles pointing right and left. —*Hook. f. Fl. Nov. Zel.* i (1853) 91; *Handb. N.Z. Fl.* (1864) 99; *Benth. Fl. Austral.* iii (1866) 376; *T. Kirk Students' Fl.* (1899) 214; *Cheesem. Man. N.Z. Fl.* (1906) 225. Scandix glochidiata *Lab. Fl. Nov. Holl.* i (1804) 75, t. 102.

North and South Islands, Chatham Islands: Abundant in lowland districts throughout. October–December.

The allied *D. carota* L., the origin of the cultivated carrot, has become naturalized in several localities in both Islands. It can be distinguished from *D. brachiatus* by its greater size, broader leaf-segments, and much larger compact flat-topped umbels.

Family LXXVIII. CORNACEAE.

Trees or shrubs. Leaves opposite or alternate, usually entire; stipules wanting. Flowers generally small, regular, hermaphrodite or unisexual, in axillary or terminal cymes, panicles, or heads. Calyx-tube adnate to the ovary, limb 4–5-toothed or wanting. Petals 4–5 or wanting, inserted round the margin of an epigynous disc, valvate or imbricate. Stamens inserted with the petals and equal to them in number, rarely twice as many. Ovary inferior, 1–4-celled, crowned by a fleshy disc; style single (3 in *Griselinia*), long or short; ovules solitary (rarely 2–3), pendulous from the top of the cell, anatropous. Fruit usually drupaceous, indehiscent, 1–4-celled, or rarely with 2 pyrenes. Seed pendulous, testa thin; albumen copious, fleshy; embryo axile, radicle superior.

A small family, scattered over the whole world, but chiefly found in the North Temperate Zone. Genera 12; species 85. Properties unimportant. Of the 2 New Zealand genera, *Corokia* is endemic; *Griselinia* extends to South America.

Hermaphrodite. Leaves narrow, silky-tomentose below .. 1. Corokia.
Dioecious. Leaves broad, glabrous .. .. 2. Griselinia.

1. COROKIA A. Cunn. 1839.

Evergreen shrubs; branches straight or tortuous; bark black. Leaves alternate or fascicled, petiolate, entire. Flowers small, hermaphrodite, yellow, in axillary or terminal panicles, racemes, or fascicles. Calyx-tube turbinate; limb 5-lobed, valvate. Petals 5, valvate, furnished with a small scale at the base, silky outside. Stamens 5. Ovary 1–2-celled; style short; stigma almost capitate, 2-lobed. Drupe ovoid or broadly oblong, crowned by the persistent calyx-limb, 1–2-celled; seeds 1 in each cell.

C. callenetii Riley Kew Bull. 1926. (2). 53.

A small genus of 4 species, confined to the New Zealand area.

Leaves lanceolate. Flowers in terminal panicles .. .. 1. *C. buddleoides.*
Leaves oblong-lanceolate. Flowers in axillary racemes .. 2. *C. macrocarpa.*
Leaves oblanceolate to oblong-lanceolate. Flowers in axillary fascicles or few-flowered terminal panicles .. .. .. 3. *C. Cheesemanii.*
Leaves orbicular or obovate, narrowed into short flat petioles. Flowers in few-flowered fascicles or solitary .. .. 4. *C. Cotoneaster.*

1. **C. buddleoides** *A. Cunn. Precur.* (1839) n. 579.—An erect much-branched slender shrub 6–12 ft. high; young branchlets, under-surface of leaves, and inflorescence densely clothed with silvery-white tomentum. Leaves alternate, shortly petioled, 3–6 in. long, lanceolate or linear-lanceolate, acute or acuminate, coriaceous, dark-green and shining above; veins reticulated. Panicles terminal, leafy at the base. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. diam., yellow. Petals oblong-lanceolate. Drupe oblong, $\frac{1}{4}$ in. long, dark-red.—*Hook. Ic. Plant.* (1842) t. 424; *Raoul Choix* (1846) 46; *Hook. f. Fl. Nov. Zel.* i (1853) 98; *Handb. N.Z. Fl.* (1864) 106; *T. Kirk Students' Fl.* (1899) 224; *Cheesem. Man. N.Z. Fl.* (1906) 237; *Ill. N.Z. Fl.* i (1914) t. 76.

Var. **linearis** *Cheesem.*—Leaves narrower, $\frac{1}{4}$–$\frac{1}{3}$ in. wide.

North Island: Not uncommon in woods as far south as the East Cape and Rotorua. Sea-level to 3000 ft. *Korokia-taranga.* November–December. Var. *linearis:* Upper Kauaeranga Valley, Thames, *T. F. C.*

The pale-green leaves, with their silvery-white under-surface, and bright-yellow starlike flowers render this an attractive plant.

2. **C. macrocarpa** *T. Kirk Students' Fl.* (1899) 224.—An erect shrub 15–20 ft. high; branches stout, spreading; branchlets, leaves beneath, and branches of the inflorescence densely covered with silvery-white tomentum. Leaves alternate, 2–4 in. long, oblong-lanceolate to elliptic-oblong, acute or apiculate, rarely obtuse, coriaceous, gradually narrowed into rather short petioles. Flowers $\frac{1}{3}$ in. diam., yellow, in axillary racemes shorter than the leaves; pedicels short. Petals lanceolate, acute. Drupe $\frac{1}{3}$ in. long, broadly oblong, dark-red.—*Cheesem. Man. N.Z. Fl.* (1906) 237. C. buddleoides *var.* b *Hook. f. Fl. Nov. Zel.* i (1853) 98; *Handb. N.Z. Fl.* (1864) 106; *F. Muell. Veg. Chath. Is.* (1864) 16.

Chatham Islands: *Dieffenbach, H. H. Travers! G. Mair! F. A. D. Cox! Whakataka; Hokotaka.*

Closely allied to *C. buddleoides*, but amply distinct in the broader leaves, axillary racemose flowers, and larger fruit.

3. **C. Cheesemanii** *H. Carse in Trans. N.Z. Inst.* xlv (1913) 276.—A slender twiggy shrub 5–12 ft. high. Branches spreading, not tortuous nor interlaced, as in *C. Cotoneaster*. Young shoots, under-surface of leaves, and inflorescence densely clothed with silvery-white tomentum. Leaves alternate, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, variable in shape, oblanceolate to oblong-lanceolate or elliptic-oblong, sometimes oblong-obovate; petioles usually short. Flowers in fascicles of 4–5 in the axils of the leaves or in few-flowered terminal panicles. Flowers very similar to those of *C. Cotoneaster*, yellow. Drupe broadly oblong, $\frac{1}{5}$–$\frac{1}{4}$ in. diam., red.

North Island: Kapowairua, eastern end of Spirits Bay, North Cape district, *T. F. C.*; Tauroa (Reef Point), near Ahipara, *H. B. Matthews! H. Carse!* wooded gullies near Muriwai (coast north of the Manukau Heads), *T. F. C.* October–November.

Probably a hybrid between *C. buddleoides* and *C. Cotoneaster*. It is only found, so far as my own experience is concerned, where both species are growing together, and it is almost exactly intermediate in characters between the two. It may be the same as *C. virgata* Turrill in Bot. Mag. (1912) t. 8466, of which I have seen no authenticated specimens. If so, Mr. Turrill's name will take precedence.

4. **C. Cotoneaster** *Raoul Choix* (1846) 22, t. 20.—A rigid densely branched shrub 4–8 ft. high; branches tortuous and interlaced; bark black; branchlets, under-surface of leaves, and inflorescence clothed with appressed

silvery-white tomentum. Leaves alternate or in alternate fascicles, ⅓–1 in. long; blade orbicular to obovate or oblong-ovate, obtuse or emarginate, coriaceous, shining above, suddenly narrowed into a broad flat petiole. Flowers small, axillary and terminal, solitary or 2–4 together; pedicels short, bracteolate. Petals narrow linear-oblong, acute. Drupe globose, ¼ in. diam., red.—*Hook. f. Fl. Nov. Zel.* i (1853) 98; *Handb. N.Z. Fl.* (1864) 106; *T. Kirk Students' Fl.* (1899) 224; *Cheesem. Man. N.Z. Fl.* (1906) 238.

North and South Islands: Not uncommon from the North Cape to Foveaux Straits. Sea-level to 2500 ft. November–January.

2. **GRISELINIA** Forst. 1786.

Shrubs or trees; branches terete or angled, transversely scarred at the nodes. Leaves alternate, often unequal at the base, broad, very coriaceous; petiole dilated into a short sheath, jointed on the branch. Flowers small, dioecious, in glabrous or pubescent panicles or racemes; pedicels jointed. Male flowers: Calyx minute, 5-toothed. Petals 5, imbricate. Stamens 5. Disc fleshy, pentagonous. Female flowers: Calyx-tube ovoid or turbinate, limb 5-toothed. Petals valvate or wanting. Rudimentary stamens wanting. Ovary 1–2-celled; styles 3, very short, subulate, recurved; ovules solitary in each cell. Fruit a 1- or rarely 2-celled berry, 1-seeded; seed oblong, testa membranous.

A small genus of 8 species, 6 of which are natives of Chile, the remaining 2 endemic in New Zealand. The Chinese and Japanese genus *Aucuba* is very closely allied.

Leaves large, 3–7 in., very unequal at the base. Petals wanting in the female flowers .. .. 1. *G. lucida.*

Leaves smaller, 1½–4 in. long, not very unequal at the base. Petals present in both male and female flowers.. .. .. .. 2. *G. littoralis.*

1. **G. lucida** *Forst. f. Prodr.* (1786) n. 401.—A stout branching shrub or small tree 3–25 ft. high, often growing on rocks or epiphytic on the branches of tall forest-trees; bark thick, furrowed. Leaves 3–7 in. long, obliquely ovate or oblong, rounded at the tip, very unequal-sided at the base, bright yellow-green, glossy, very thick and leathery; petiole short, stout. Panicles axillary or subterminal, much branched, 3–6 in. long; rhachis and pedicels pubescent. Flowers minute, greenish; females apetalous. Berry ⅓ in. long, fleshy, dark-purple, usually 1-celled. Seed solitary.—*A. Cunn. Precur.* (1839) n. 639; *Raoul Choix* (1846) 46; *Hook. f. Fl. Nov. Zel.* i (1853) 98; *Handb. N.Z. Fl.* (1864) 105; *T. Kirk Forest Fl.* (1889) t. 41; *Students' Fl.* (1899) 225; *Cheesem. Man. N.Z. Fl.* (1906) 238; *Ill. N.Z. Fl.* i (1914) t. 77.

Scopolia lucida J.R.&G. Forst. 1776. p. 140. t. 70.

North and South Islands: From the North Cape southwards to Dusky Sound and Foveaux Strait, but often local, especially in the South Island. *Puka.* October–November.

2. **G. littoralis** *Raoul Choix* (1846) 22, t. 19.—A round-headed tree 30–50 ft. high; trunk short, irregular, gnarled or twisted, 2–5 ft. diam.; bark rough, furrowed. Leaves 1–4 in. long, ovate or oblong-ovate, rounded at the tip, less unequal-sided at the base than in *G. lucida* and sometimes almost symmetrical, pale yellowish-green, thick and coriaceous, veins obscure; petiole rather slender, ½–1 in. long. Panicles axillary, 1–3 in. long, smaller than in *G. lucida* and sometimes reduced to a simple raceme;

(1) Ann. Bot. N.S. 5: 579-585. Cullen. Berie Chr. No 11.

rhachis and pedicels pubescent. Flowers minute; both male and female with petals. Berry $\frac{1}{4}$ in. long, oblong. Seed solitary.—*Hook. f. Handb. N.Z. Fl.* (1864) 105; *T. Kirk Forest Fl.* (1889) t. 42; *Students' Fl.* (1899) 225. Pukateria littoralis *Raoul in Ann. Sci. Nat.* Ser. iii, 2 (1844) 120.

North and South Islands, Stewart Island: From Mount Tutamoe (Northern Wairoa) and the Little Barrier Island southwards, but rare and local to the north of the East Cape; abundant in the South Island. Sea-level to 3500 ft. *Kapuka; Papaumu; Broad-leaf.* October–November.

Timber strong, close-grained and durable; frequently used for house-blocks, fencing-posts, &c.

Family LXXIX. **ERICACEAE.**

Shrubs or small trees, sometimes low and creeping. Leaves usually alternate, sometimes opposite or whorled, rigid, simple, entire or serrate; stipules wanting. Flowers regular, hermaphrodite. Calyx inferior, 4–5-toothed or -cleft. Corolla gamopetalous, hypogynous, regular, often campanulate or urceolate, 4–5-toothed or -lobed (in some exotic genera divided into 4–5 free petals). Stamens usually double the number of the corolla-lobes, rarely the same number, hypogynous or sometimes adnate to the base of the corolla; filaments free; anthers 2-celled, opening by terminal pores or slits, often furnished with appendages. Ovary superior, 4–5-celled; style simple, terminal; stigma capitate, entire or shortly lobed; ovules usually many, attached to the inner angle of the cell or pendulous from the top of the angle. Fruit a capsule or berry, sometimes enclosed in the enlarged and succulent calyx (*Gaultheria*). Seeds usually numerous small; albumen fleshy; embryo straight, axile.

A large family, widely spread over the whole world, especially in temperate and cool regions, but singularly rare in Australia and New Zealand, where its place is taken by the allied family *Epacridaceae*. In the tropics it is principally found on high mountains. Genera between 50 and 60; species not far from 1300. The properties of the family are unimportant, but it contains some of the most beautiful shrubs cultivated in gardens, as the various kinds of *Rhododendron*, *Azalea*, *Erica*, *Arbutus*, &c. Of the two genera found in New Zealand, *Gaultheria* has a wide range in Asia and America, and is also found in Australia; *Pernettya* is principally South American, but occurs in Tasmania as well.

(2)
Fruit dry, capsular, usually enclosed in the enlarged and succulent calyx .. .. 1. Gaultheria.
Fruit a berry, calyx persistent at its base, but not fleshy nor enlarged .. .. 2. Pernettya.

1. **GAULTHERIA** Kalm.

Erect or procumbent shrubs, often hispid or strigose. Leaves persistent, alternate, usually serrate or serrulate, coriaceous. Flowers small, racemose or axillary and solitary. Calyx 5-lobed or -partite, in fruit usually enlarged and more or less succulent and coloured. Corolla urceolate or campanulate, 5-lobed; lobes imbricate, spreading or recurved. Stamens 10, included within the corolla-tube; filaments more or less dilated; anthers 2-celled, each cell opening by a terminal or oblique pore and tipped with 2 erect awns. Ovary 5-celled, with several ovules in each cell; style cylindric; stigma simple. Capsule 5-celled, loculicidally 5-valved, included in the usually enlarged and succulent calyx. Seeds numerous, minute, subglobose or obtusely angled.

GENUS GAULTHERIA AND PERNETTYA IN NEW ZEALAND

B. L. Burtt and A. W. Hill

Linn. Soc. Journ. - Botany - Vol. xlix, (No.332) Jan. 1935, p.611.

GAULTHERIA

Flowers racemose.

A Calyx dry and unaltered in fruit. N.Z.

B Leaves opposite or subopposite, ovate, cordate at the base, usually about 3.5 cm. long and 2 cm. broad; flowers paniculate; pedicels bibracteolate at the base, glabrous or minutely pubescent, about 5 mm. long; corolla glabrous*, anther-cells conspicuously biaristate . . . . . 1. oppositifolia

BB Leaves alternate, narrowed, or at the most rounded at the base.

C Leaves oblong or elliptic-oblong, 3-5 cm. long and 1-2 cm. broad; branchlets setose; flowers paniculate; pedicels 4 mm. long, pubescent, and with some thicker hairs, bibracteolate at the base; corolla glabrous; anther-cells biaristate . . . . . 2. paniculata

CC Leaves lanceolate, up to 3 cm. long and 1 cm. broad, or small, thick, c.1.5 cm. long, elliptic to suborbicular.

D Branchlets setose and usually pubescent; flowers racemose, often forming a panicle; calyx segments with marginal outgrowths; anther-cells biaristate . . . . . 3. rupestris

DD Branchlets pubescent only; leaves small, 1 cm. long and 0.5-0.8 cm. broad, oblong or suborbicular, veins impressed; racemes terminal; pedicels bibracteolate at the base; corolla pubescent within. . . . . 4. Colensoi

* Very occasionally pubescent within.

(b) Ann. Bot. N.S. 5: 579-585. Cullen, J. Berrie Chr. No 11.

Flowers solitary, or occasionally subracemose towards the ends of the branches. Dwarf plant up to about 15 cm. high; branchlets setose; leaves elliptic to suborbicular, about 1 cm. long and 0.5 cm. broad, crenate, often setose on the margins, veins impressed; 'fruits' large and fleshy, red or white . . . . . 7. depressa

BB Erect plant up to about 2 m. high; branchlets setose and sometimes also densely pubescent; leaves variable in shape, thinner, and with sharper serrations than in G. depressa; veins slightly prominent; fruiting calyx fleshy, red or white, but much smaller than in G. depressa*, or sometimes dry . . . . . 8. antipoda

* Unfortunately only dried material is available for measuring, but in G. antipoda the fleshy fruits seem to average about 0.4-0.5 cm. in diameter, in G. depressa about 0.7-1 cm.

branches, which thus form leafy racemes; peduncles short, curved, bracteolate, pubescent. Calyx 5- or rarely 6-lobed; lobes ovate-oblong, acute. Corolla $\frac{1}{10}$–$\frac{1}{8}$ in. long. Capsule usually included in the enlarged and succulent calyx-lobes, forming a red or white globose berry-like fruit $\frac{1}{2}$ in. diam., but frequently the lobes remain dry and unaltered.—*A. Rich. Fl. Nouv. Zel.* (1832) 211, t. 28; *A. Cunn. Precur.* (1838) n. 417; *Raoul Choix* (1846) 44; *Hook. f. Fl. Nov. Zel.* i (1853) 161; *Handb. N.Z. Fl.* (1864) 174; *Cheesem. Man. N.Z. Fl.* (1906) 405. Brousea antipoda (Forst. f.) Skottsb. Rec. Gen. 1891: 388

Var. **erecta**. — Erect, much branched. Leaves large, $\frac{1}{2}$–$\frac{3}{4}$ in., broadly oblong or orbicular.—G. epiphyta *Col. in Trans. N.Z. Inst.* xxii (1890) 474.

Var. **fluviatilis** *Hook. f. Fl. Nov. Zel.* i (1853) 161. — Erect, virgately branched. Leaves large, $\frac{1}{3}$–$\frac{2}{3}$ in., oblong-lanceolate or lanceolate. Flowers small, almost racemed, on longer and more slender pedicels.—G. fluviatilis *A. Cunn. Precur.* (1838) n. 419.

North and South Islands, Stewart Island: Both varieties abundant throughout, from the North Cape southwards. Sea-level to 4000 ft.

A variable plant in most of its characters, particularly in the fruiting-calyx, which may be greatly enlarged, highly coloured, and succulent, or may remain dry and unaltered. Both succulent and dry calyces may be found on the same branch.

2. **G. depressa** *Hook. f. in Lond. Journ. Bot.* vi (1847) 267.—Depressed or prostrate. Stems 6–9 in. long, creeping and rooting, naked below. Branches numerous, much divided, horizontally spreading, 1–4 in. long, glabrous or puberulous or more usually clothed with fulvous bristles. Leaves alternate, $\frac{1}{6}$–$\frac{1}{3}$ in. long, shortly petiolate, orbicular-obovate to broadly oblong, thick and coriaceous, coarsely serrate, teeth often bristle-

(4) a

(3)

A genus of nearly 100 species, mainly American, stretching from Oregon to Cape Horn, a few found in Australia and New Zealand, some in India and the Malay Archipelago, and one in Japan. In the New Zealand species the calyx is sometimes enlarged and succulent and sometimes dry and unaltered when the fruit is ripe, and occasionally the capsule may be slightly succulent, thus breaking down the distinction between *Pernettya* and *Gaultheria*. One of the species extends to Tasmania, the remainder are endemic.

* Leaves alternate. Flowers axillary, the tips of the branches sometimes forming leafy racemes.

Stems erect, large. Leaves variable, orbicular to oblong-lanceolate 1. *G. antipoda.*
Stems prostrate, small. Leaves orbicular to oblong-lanceolate .. 2. *G. depressa.*
Stems slender, flexuous, often intertwined. Leaves linear-lanceolate 3. *G. perplexa.*

** Leaves alternate. Flowers in axillary and terminal racemes.

Leaves oblong-lanceolate to broad-oblong .. .. .. 4. *G. rupestris.*
Leaves ovate-oblong, cordate at the base .. .. .. 5. *G. fagifolia.*

*** Leaves opposite. Flowers in axillary and terminal often compound racemes.

Leaves ovate or ovate-oblong, cordate at the base, sessile .. 6. *G. oppositifolia.*

1. **G. antipoda** *Forst. f. Prodr.* (1786) n. 196. — An erect or prostrate much or sparingly branched rigid shrub, very variable in size and habit, on the mountains frequently only a few inches high, in lowland situations 2–4 ft. or more. Branches stout, sometimes glabrous, but usually more or less clothed with blackish or yellow-brown bristles intermixed with a short and fine white pubescence. Leaves alternate, shortly petiolate, variable in size, $\frac{1}{3}$–$\frac{2}{3}$ in., orbicular or broadly oblong to oblong-lanceolate, obtuse or acute, bluntly serrate, very thick and coriaceous, conspicuously veined, glabrous except the petioles, which are hispid-pubescent. Flowers small, white or red, axillary and solitary, often crowded at the ends of the branches, which thus form leafy racemes; peduncles short, curved, bracteolate, pubescent. Calyx 5- or rarely 6-lobed; lobes ovate-oblong, acute. Corolla $\frac{1}{10}$–$\frac{1}{8}$ in. long. Capsule usually included in the enlarged and succulent calyx-lobes, forming a red or white globose berry-like fruit $\frac{1}{2}$ in. diam., but frequently the lobes remain dry and unaltered.—*A. Rich. Fl. Nouv. Zel.* (1832) 211, t. 28; *A. Cunn. Precur.* (1838) n. 417; *Raoul Choix* (1846) 44; *Hook. f. Fl. Nov. Zel.* i (1853) 161; *Handb. N.Z. Fl.* (1864) 174; *Cheesem. Man. N.Z. Fl.* (1906) 405.

Var. **erecta.** — Erect, much branched. Leaves large, $\frac{1}{2}$–$\frac{3}{4}$ in., broadly oblong or orbicular.—G. epiphyta *Col. in Trans. N.Z. Inst.* xxii (1890) 474.

Var. **fluviatilis** *Hook. f. Fl. Nov. Zel.* i (1853) 161. — Erect, virgately branched. Leaves large, $\frac{1}{3}$–$\frac{2}{3}$ in., oblong-lanceolate or lanceolate. Flowers small, almost racemed, on longer and more slender pedicels.—G. fluviatilis *A. Cunn. Precur.* (1838) n. 419.

North and South Islands, Stewart Island: Both varieties abundant throughout, from the North Cape southwards. Sea-level to 4000 ft.

A variable plant in most of its characters, particularly in the fruiting-calyx, which may be greatly enlarged, highly coloured, and succulent, or may remain dry and unaltered. Both succulent and dry calyces may be found on the same branch.

2. **G. depressa** *Hook. f. in Lond. Journ. Bot.* vi (1847) 267.—Depressed or prostrate. Stems 6–9 in. long, creeping and rooting, naked below. Branches numerous, much divided, horizontally spreading, 1–4 in. long, glabrous or puberulous or more usually clothed with fulvous bristles. Leaves alternate, $\frac{1}{6}$–$\frac{1}{3}$ in. long, shortly petiolate, orbicular-obovate to broadly oblong, thick and coriaceous, coarsely serrate, teeth often bristle-

pointed, veins conspicuous, strongly reticulated. Flowers small, axillary, sometimes almost forming leafy racemes. Berry large, $\frac{1}{3}$–$\frac{2}{3}$ in. diam., globose, fleshy, white or red.—G. antipoda *var.* depressa *Hook. f. Fl. Nov. Zel.* i (1853) 161 ; *Fl. Tasm.* i (1860) 241, t. 73 ; *Handb. N.Z. Fl.* (1864) 175 ; *Cheesem. Man. N.Z. Fl.* (1906) 405.

Var. **microphylla** *Cheesem. n. comb.* — Prostrate, sparingly branched, glabrous or clothed with sparse whitish or fulvous bristles. Leaves $\frac{1}{6}$–$\frac{1}{3}$ in. long, ovate to linear-lanceolate. G. antipoda *var.* microphylla *Hook. f. Fl. Nov. Zel.* i (1853) 161 ; *Handb. N.Z. Fl.* (1864) 175 ; *Cheesem. Man. N.Z. Fl.* (1906) 406.

North and South Islands, Stewart Island : Both varieties not uncommon in mountain districts from the East Cape southwards, alt. 2500–5000 ft.

3. **G. perplexa** *T. Kirk in Trans. N.Z. Inst.* xxix (1897) 538 (*name only*).—A small suberect or prostrate bush 1–3 ft. high, rarely more ; branches flexuous, often much and closely interlaced ; bark dark red-brown ; branchlets clothed with short white pubescence intermixed with long erect or spreading yellow-brown bristles. Leaves alternate, spreading, very shortly petiolate, $\frac{1}{4}$–$\frac{1}{2}$ in. long, lanceolate or linear-lanceolate or linear, often curved, acute or acuminate, serrate, the teeth usually bristle-pointed, thick and coriaceous, quite glabrous. Flowers small, solitary and axillary, often crowded at the ends of the branches ; peduncles short, bracteolate, curved. Calyx-lobes minutely ciliolate. Corolla broadly urceolate, $\frac{1}{10}$ in. long. Capsule usually included in the enlarged and fleshy calyx-lobes, forming a berry-like fruit $\frac{1}{2}$ in. in diam., but frequently the calyx remains dry and unchanged.—*Cheesem. Man. N.Z. Fl.* (1906) 406 ; *Ill. N.Z. Fl.* ii (1914) t. 122. G. antipoda *var.* ciliata *Hook. f. Fl. Nov. Zel.* i (1853) 161 ; *Handb. N.Z. Fl.* (1864) 175.

North and South Islands, Stewart Island : Mountain districts from Lake Taupo southwards, by no means uncommon. Most generally seen between 1500 and 3000 ft. ; but ascends to 5000 ft. on the Kaimanawa Mountains, and descends to sea-level on Stewart Island, and in several localities in the South Island.

Easily separated from all the other species found in New Zealand by the long and flexuous much and closely interlaced branches, and by the small and narrow leaves, the teeth of which are bristle-pointed.

4. **G. rupestris** *R. Br. Prodr.* (1810) 559.—An erect or more rarely procumbent or prostrate much-branched shrub varying in height from a few inches to 3 or 4 ft., sometimes attaining 5 to 6 ft. or more ; branches stout, glabrous or slightly pubescent, occasionally setose. Leaves close-set, alternate, shortly petiolate, very variable in size and shape, $\frac{1}{3}$–2 in. long, from oblong or elliptic-lanceolate to oblong or oblong-ovate or almost orbicular, acute or obtuse, crenulate or serrulate, very thick and coriaceous, reticulated on both surfaces, often shining above, quite glabrous. Racemes axillary and terminal, often crowded towards the ends of the branches, simple or branched, few- or many-flowered, $\frac{1}{4}$–2 in. long ; pedicels longer or shorter than the bracteoles. Flowers white. Calyx-lobes ovate, acute, ciliolate, usually remaining unaltered in fruit, although baccate specimens are not uncommon.—*A. Cunn. Precur.* (1838) n. 418 ; *Raoul Choix* (1846) 44 ; *Hook. f. Fl. Nov. Zel.* i (1853) 161, t. 42 ; *Handb. N.Z. Fl.* (1864) 175 ; *Cheesem. Man. N.Z. Fl.* (1906) 406. G. divergens *Col. in Trans. N.Z. Inst.* xx (1888) 198. G. subcorymbosa *Col. l.c.* xxii (1890) 476. G. glandulosa *Col. l.c.* xxviii (1896) 600. G. calycina *Col. l.c.* xxxi (1899) 274. Andromeda rupestris *Forst. f. Prodr.* (1786) n. 195 ; *A. Rich. Fl. Nouv. Zel.* (1832) 208, t. 27.

A highly variable plant, the numerous forms of which are best arranged under two heads, as under :—

Var. **lanceolata**. — Leaves large, oblong-lanceolate or obovate-lanceolate, acute, branches glabrous or more or less pubescent or setose.

Var. **parvifolia**. — Leaves smaller and broader, oblong or oblong-ovate to orbicular-ovate ; branches glabrous or rarely pubescent.

North and South Islands : Not uncommon in hilly and mountainous districts from the Thames goldfields southwards. Sea-level to 5000 ft. November–February.

Some forms of this come very close to *G. antipoda* in foliage, but can always be distinguished by the truly racemose inflorescence.

5. **G. fagifolia** *Hook. f. Fl. Nov. Zel.* i (1853) 162.—An erect much-branched shrub 4–5 ft. high ; branches spreading or ascending, rigid, younger ones more or less setose. Leaves alternate or subopposite, shortly petiolate, ½–1 in. long, oblong or ovate-oblong to broadly ovate, acute or subacute, cordate at the base, crenate-serrate, very thick and coriaceous, both surfaces finely reticulated, quite glabrous. Racemes axillary and terminal, ½–2 in. long, sometimes compound. Flowers white. Calyx-lobes ovate, acute, remaining unaltered in all the fruiting specimens I have seen. —*Handb. N.Z. Fl.* (1864) 175 ; *Cheesem. Man. N.Z. Fl.* (1906) 407.

North Island : Near Rotorua, *Spencer !* Lake Rotokakahi, *G. Mair !* Motukino, near Lake Taupo, *Colenso ! T. Kirk ! H. J. Matthews !* 1000–2000 ft. December–February.

This appears to me a mere form of *G. rupestris*, verging towards *G. oppositifolia*, or possibly a hybrid between the two plants.

6. **G. oppositifolia** *Hook. f. Fl. Nov. Zel.* i (~~1853~~ 1854) 162, t. 43.—A much-branched shrub 2–8 ft. high ; branches spreading, glabrous or sparingly setose. Leaves opposite, sessile or nearly so, sometimes stem-clasping, 1½–2½ in. long or more, ovate or oblong-ovate, acute or obtuse, cordate at the base, crenate-serrate, very thick and coriaceous, both surfaces finely reticulated, glabrous or sparingly minutely setulose. Racemes axillary and terminal, the latter often compound, forming broad terminal panicles 2–4 in. long, with opposite spreading branches. Flowers very numerous, white, about ⅙ in. long. Calyx-lobes ovate-triangular, acute, remaining unaltered in all the fruiting specimens I have seen. Capsule dry.—*Handb. N.Z. Fl.* (1864) 175 ; *Cheesem. Man. N.Z. Fl.* (1906) 407 ; *Ill. N.Z. Fl.* ii (1914) t. 123. G. multibracteolata *Col. in Trans. N.Z. Inst.* xxiv (1892) 389.

North Island : Abundant from Matamata, in the Upper Thames Valley, to Rotorua, the Upper Waikato, and Taupo, *G. Mair ! T. Kirk ! Petrie ! T. F. C. ;* cliffs between Hawke's Bay and Taupo, *Colenso ;* East Cape, between Whangaparaoa and Hicks Bay, *Bishop Williams !* near Wanganui, *H. C. Field !* 500–3500 ft. November–January.

A very handsome plant, easily recognized by the large opposite leaves, which are sessile and cordate at the base, and by the usually panicled racemes.

2. **PERNETTYA** Gaud.

Glabrous or hispid rigid shrubs, usually of small size. Leaves small, alternate, shortly petiolate, penniveined, serrate. Flowers small, axillary and solitary or racemose. Calyx 5-partite, not enlarged and succulent in fruit. Corolla urceolate or almost globose, shortly 5-lobed ; lobes recurved.

Stamens 10, included within the corolla-tube; filaments dilated at the base; anthers 2-celled, dehiscing by a large terminal pore, cells each with 2 erect awns. Ovary 5-lobed and 5-celled; ovules several in each cell; style cylindrical; stigma simple. Berry globose, 5-celled. Seeds numerous, minute, compressed.

A genus comprising about 15 species, all American except the one described below and a closely allied one from the mountains of Tasmania.

Pernettya macrostigma Col. in Trans. N.Z. Inst. xxi (1889) 92 is shown by the type specimens in Mr. Colenso's herbarium to be *Gaultheria depressa* var. *microphylla*. In like manner, *P. polyphylla* Col. *l.c.* xxxi (1899) 274 is identical with *Pentachondra pumila*.

1. **P. nana** *Col. in Trans. N.Z. Inst.* xxiii (1891) 389.—A small creeping densely matted little shrub; branches short, ascending, ½–3 in. high, rarely more, minutely puberulous towards the tips. Leaves very shortly petiolate, ⅙–¼ in. long, oblong-lanceolate to oblong, acute or subacute, very thick and coriaceous, glabrous or very minutely puberulous, entire or with 2–3 indistinct teeth on each side. Flowers 2–4 near the tips of the branches, solitary, axillary, about ⅙ in. long; peduncles short, 2–3-bracteolate. Calyx-lobes ovate-triangular, acute, ciliolate. Corolla broadly urceolate. Stamens reaching above the base of the corolla-lobes; filaments 4 or 5 times as long as the anthers, gradually dilated downwards. Anthers oblong, each cell tipped with 2 short bristles. Style cylindrical, equalling the stamens in length; stigma minutely 5-toothed. Berry globose-depressed, seated in the persistent calyx, which is sometimes slightly enlarged and fleshy.—*Cheesem. Man. N.Z. Fl.* (1906) 408. Pernettya tasmanica *Hook. f. Handb. N.Z. Fl.* (1864) 176 (*but not of Fl. Tasm.* i (1860) 242, t. 73B). P. tasmanica *var.* neo-zealandica *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 351.

South Island: Canterbury — By the Porter River and in other places in the Broken River basin, *J. D. Enys! T. Kirk! T. F. C.!* Lake Heron, *Cockayne;* Mount Arrowsmith, *Cockayne* and *R. M. Laing;* Canterbury Alps, *J. F. Armstrong!* Mount Cook district, *Suter! T. F. C.;* Hopkins River, *Haast.* Otago—Hector Mountains and Mount Bonpland, *Petrie!* Mount Earnslaw, *Cockayne;* Mount Ida, *H. J. Matthews.* 2000–5000 ft. December–February.

This was referred to *P. tasmanica* by Hooker, but it appears constantly to differ from that plant in the rather broader leaves, acute triangular calyx-lobes, longer filaments, which equal or exceed the style in length, and especially in the anther-cells having 2 minute awns at the tip, in this respect agreeing with the American species of the genus.

Family LXXX. EPACRIDACEAE.

Shrubs or rarely small trees. Leaves alternate, seldom opposite, often crowded or imbricate, rigid, entire or sometimes serrulate, often longitudinally nerved; stipules wanting. Flowers regular, hermaphrodite, axillary or terminal, solitary or in spikes or racemes. Calyx inferior, 4–5-partite, or of 4–5 free sepals; divisions persistent, coriaceous, striate, imbricate. Corolla gamopetalous, hypogynous, 4–5-lobed or -partite. Stamens 4–5, hypogynous or inserted on the tube or throat of the corolla; anthers 1-celled, opening longitudinally for their whole length. Disc surrounding the base of the ovary, cup-shaped or annular, 5-lobed or of 5 separate scales. Ovary superior, 1–10-celled but usually 5-celled; style simple, stigma usually capitate; ovules 1 or many in each cell, anatropous. Fruit either a drupe with 2–5 1-seeded pyrenes or a many-seeded capsule with loculicidal dehiscence. Seeds small, albuminous; embryo straight, axile, radicle next the hilum.

PERNETTYA

Dwarf or trailing plants; leaves generally less than 1 cm. long.
Trailing plant with wiry branches, the young ones sparingly setose; leaves usually linear, about 0.8-1 cm. long and 0.4 cm. broad; flowers solitary; pedicels 2-3 mm. long with several small bracteoles; calyx segments shortly but conspicuously ciliate; anther cells conspicuously biaristate; fruiting calyx fleshy; fruit baccate, half exserted from the fleshy calyx . . . . . 2. P. macrostigma

Dwarf compact plants with numerous small leaves.
Filaments ribbon-like, gradually and evenly widened towards the base, smooth; anther cells with two short rigid awns. Leaves up to 3-6 mm. long and 1-2 mm. broad; flowers solitary; pedicels about 3 mm. long with 3-4 bracteoles; calyx segments ciliate, fruiting calyx fleshy; fruit baccate (sometimes thin-walled?) . . . . . 3. P. nana

The only satisfactory distinguishing character between the two genera is in the fruit, Pernettya having a fleshy berry and Gaultheria a dry dehiscent capsule.

Fl. Austral. IV (1869) 164; *Cheesem. Man. N.Z. Fl.* (1906) 410. P. rubra *Col. in Trans. N.Z. Inst.* xxviii (1896) 601.—P. polyphylla *Col. l.c.* xxxi (1899) 274. Trochocarpa novae-zealandiae *Col. l.c.* xxviii (1896) 602. Epacris pumila *Forst. f. Prodr.* (1786) n. 70. Char. Syn. 1776: 20

NORTH AND SOUTH ISLANDS, STEWART ISLAND: In hilly and mountainous districts; rare from Cape Colville southwards to the East Cape and the central volcanic plateau, from thence abundant to Stewart Island. Chiefly found between 2000 and 5000 ft., but descends to sea-level in Stewart Island. December–February.

Corolla gamopetalous, hypogynous, 4–5-lobed or -partite. Stamens 4–5, hypogynous or inserted on the tube or throat of the corolla; anthers 1-celled, opening longitudinally for their whole length. Disc surrounding the base of the ovary, cup-shaped or annular, 5-lobed or of 5 separate scales. Ovary superior, 1–10-celled but usually 5-celled; style simple, stigma usually capitate; ovules 1 or many in each cell, anatropous. Fruit either a drupe with 2–5 1-seeded pyrenes or a many-seeded capsule with loculicidal dehiscence. Seeds small, albuminous; embryo straight, axile, radicle next the hilum.

A small family, mainly separated from *Ericaceae* by the 1-celled anthers with longitudinal dehiscence. It is almost wholly confined to Australia and New Zealand, a few species only being found in the Pacific islands and the Malay Archipelago, and one in temperate South America. Genera 26; species about 300. The properties of the family are unimportant, but many of the species are well worth cultivation from the beauty of their flowers. All the New Zealand genera are found in Australia.

* Ovules solitary in each cell of the ovary. Fruit a drupe.

Fruit with 5 distinct pyrenes	1. PENTACHONDRA.
Fruit with a 5-celled hard endocarp. Pedicels with numerous imbricating bracts	2. CYATHODES.
Pedicels with few bracts	3. LEUCOPOGON.

** Ovules numerous in each cell. Fruit a capsule.

Leaves usually petiolate, not sheathing. Bracts numerous, imbricate, passing into the calyx	4. EPACRIS.
Leaves petiolate, not sheathing. Bracts few, deciduous ..	5. ARCHERIA.
Leaves narrow, with broad sheathing bases	6. DRACOPHYLLUM.

1. **PENTACHONDRA** R. Br.

Spreading or prostrate shrubs. Leaves usually crowded, ovate-oblong or linear, striate. Flowers solitary or few together at the tips of the branches, axillary, on short peduncles. Bracts several, small, the uppermost with the rudiment of a second flower; bracteoles appressed to the calyx. Calyx 5-partite. Corolla-tube very short; lobes 5, revolute or recurved, bearded inside. Stamens 5, filaments inserted near the top of the corolla-tube, long or short; anthers exserted or included. Hypogynous scales free or connate. Ovary 5-celled; style long or short; stigma small; ovules solitary, pendulous from the top of the cell. Fruit a baccate drupe with 5 (or more) distinct 1-seeded pyrenes or nuts, sometimes fewer by abortion.

A small genus of 4 or 5 species, confined to the mountains of Australia, Tasmania, and New Zealand. The single New Zealand species has the range of the genus.

(Forst. 5)

1. **P. pumila** *R. Br. Prodr.* (1810) 549.—A much and closely branched dwarf shrub 2–6 in. high; stems stout, woody, procumbent; branches ascending, glabrous or pubescent. Leaves numerous, crowded, suberect, $\frac{1}{8}$–$\frac{1}{5}$ in. long, oblong or ovate-oblong, obtuse or with a callous tip, glossy, concave above, 3–7-nerved beneath; margins finely ciliolate. Flowers almost sessile, solitary at the tips of the branchlets, about $\frac{1}{4}$ in. long, white or red. Bracts several, small, obtuse; bracteoles much shorter than the calyx. Sepals obtuse, ciliolate. Corolla-tube cylindrical, much longer than the calyx; lobes short, recurved, bearded within. Berry rather large, $\frac{1}{4}$–$\frac{1}{2}$ in. diam., globose or broadly pyriform, red; pyrenes quite free, varying in number from 5 to 10, but usually 8.—*A. Rich. Fl. Nouv. Zel.* (1832) 217; *A. Cunn. Precur.* (1838) n. 410; *Raoul Choix* (1846) 44; *Hook. f. Fl. Nov. Zel.* i (1853) 166; *Handb. N.Z. Fl.* (1864) 178; *Benth. Fl. Austral.* iv (1869) 164; *Cheesem. Man. N.Z. Fl.* (1906) 410. P. rubra *Col. in Trans. N.Z. Inst.* xxviii (1896) 601.—P. polyphylla *Col. l.c.* xxxi (1899) 274. Trochocarpa novae-zealandiae *Col. l.c.* xxviii (1896) 602. Epacris pumila *Forst. f. Prodr.* (1786) n. 70. Char. Gen. 1776. 20

NORTH AND SOUTH ISLANDS, STEWART ISLAND: In hilly and mountainous districts; rare from Cape Colville southwards to the East Cape and the central volcanic plateau, from thence abundant to Stewart Island. Chiefly found between 2000 and 5000 ft., but descends to sea-level in Stewart Island. December–February.

2. **CYATHODES** Labill.

Shrubs, sometimes tall and erect, sometimes low-growing and diffuse or prostrate. Leaves scattered or imbricate, flat or convex, striate, often white beneath. Flowers small, axillary and solitary, on short peduncles; bracts several, imbricating, the uppermost larger and almost concealing the calyx. Calyx 5-partite. Corolla-tube usually longer than the calyx, rarely shorter; lobes 5, spreading or recurved, glabrous or bearded inside. Stamens 5, inserted near the top of the corolla-tube; filaments short, filiform or thickened; anthers oblong or linear, wholly or partly included in the corolla-tube or in the erect base of the lobes. Hypogynous disc cup-shaped or annular, or of 5 free scales. Ovary 3–5-celled (rarely 8–10-celled); style filiform; stigma small; ovules solitary, pendulous from the top of the cells. Fruit a baccate drupe; mesocarp fleshy; endocarp bony, 3–5-celled; cells 1-seeded.

A small genus of about 15 species, scattered through Australia and Tasmania, New Zealand, and the Pacific islands. One of the New Zealand species extends to Australia, the others are endemic.

* Corolla-lobes not bearded inside.

A large erect shrub. Leaves $\frac{1}{4}$–$\frac{2}{3}$ in., narrow-linear, with rigid pungent points	1. *C. acerosa.*
A large erect shrub. Leaves $\frac{1}{2}$–$\frac{3}{4}$ in., linear-oblong, subacute, not pungent	2. *C. robusta.*
Small, spreading, prostrate. Leaves $\frac{1}{8}$–$\frac{1}{4}$ in., linear, obtuse, spreading	3. *C. empetrifolia.*

** Corolla-lobes densely bearded within.

Sparingly branched, 4–18 in. high. Leaves $\frac{1}{4}$–$\frac{1}{8}$ in., linear-oblong, obtuse. Flowers in 3–5-flowered racemes	4. *C. Colensoi.*
Densely tufted, 2–5 in. Leaves $\frac{1}{8}$–$\frac{1}{6}$ in., linear-oblong, apiculate. Flowers solitary	5. *C. pumila.*

C. juniperea (Forst. f.) Druce 1916. p. 618.

1. **C. acerosa** *R. Br. Prodr.* (1810) 539.—An erect or rarely decumbent branching shrub 4–15 ft. high or more; bark black; branches woody, spreading. Leaves spreading or reflexed, $\frac{1}{4}$–$\frac{2}{3}$ in. long, acerose, linear or subulate-lanceolate, rigid, pungent-pointed, glaucous beneath, with from 3 to 7 parallel veins, the outer of which often branch towards the margin of the leaf; margins often recurved and ciliate. Flowers minute, $\frac{1}{10}$ in. long, solitary and axillary towards the tips of the branches; peduncles short, recurved, clothed with imbricating obtuse bracts. Calyx-lobes obtuse. Corolla-tube not much longer than the calyx; lobes spreading, acute, usually glabrous within. Stamens with very short filaments; anthers half-exserted. Drupe variable in size, $\frac{1}{5}$–$\frac{1}{3}$ in. diam., globose, succulent, white or red.—*A. Cunn. Precur.* (1838) n. 407; *Raoul Choix* (1846) 44; *Hook. f. Fl. Nov. Zel.* i (1853) 163; *Handb. N.Z. Fl.* (1864) 176; *Benth. Fl. Austral.* iv (1869) 170; *T. Kirk Forest. Fl.* (1889) t. 108; *Cheesem. Man. N.Z. Fl.* (1906) 411; *Ill. N.Z. Fl.* ii (1914) t. 124. C. articulata *Col. in Trans. N.Z. Inst.* xxviii (1896) 600. Leucopogon Forsteri *A. Rich. Fl. Nouv. Zel.* (1832) 216.

Juniperea Forst. f. R. & G. 1776. 20. t. 10.

Var. **a.**—Leaves rather shorter and broader, with shorter pungent points; lateral veins often branching outwards.

Var. **oxycedrus.**—Leaves usually longer and narrower, with longer pungent points; veins all unbranched.—C. oxycedrus *R. Br. Prodr.* (1810) 540.

North and South Islands, Stewart Island: Abundant from the North Cape southwards. Sea-level to 2500 ft. *Mingimingi.* August–November.

2. **C. robusta** *Hook. f. Handb. N.Z. Fl.* (1864) 177.—Habit of *C. acerosa*, but much stouter. Leaves spreading, $\frac{1}{2}$–$\frac{3}{4}$ in. long, $\frac{1}{8}$–$\frac{1}{6}$ in. broad, narrow linear-oblong or linear-lanceolate, obtuse or subacute and callous at the tip, rigid and coriaceous, 5–11-nerved beneath, the nerves often branching on the outer side; margins usually recurved. Flowers $\frac{1}{8}$ in. long, solitary and axillary, more abundantly produced than in *C. acerosa;* peduncles curved, clothed with numerous broad obtuse imbricating bracts. Corolla-tube hardly longer than the calyx-lobes, its divisions glabrous within. Berry large, globose, $\frac{1}{3}$–$\frac{1}{2}$ in. diam.—*Cheesem. Man. N.Z. Fl.* (1906) 411. C. acerosa *var.* latifolia *Hook. f. Fl. Nov. Zel.* i (1853) 163; *F. Muell. Veg. Chath. Is.* (1864) 43.

Chatham Islands: Apparently not uncommon, *Dieffenbach, H. H. Travers! G. Mair! Cockayne* and *Cox! Rutitira.*

Distinguished from *C. acerosa*, to which it is closely allied, by the larger broader leaves, which are not at all pungent, but end in obtuse callous tips, and by the larger fruit.

3. **C. empetrifolia** *Hook. f. Fl. Nov. Zel.* i (1853) 164.—A small depressed or prostrate heath-like shrub, with slender wiry tomentose branches 4–18 in. long, ascending at the tips. Leaves numerous, uniform, erect or ascending when young, spreading or reflexed when old, $\frac{1}{8}$–$\frac{1}{5}$ in. long, linear, obtuse, convex above, glaucous beneath, glabrous or pubescent or hoary; margins recurved, ciliate. Flowers small, axillary or terminal, solitary or 2–4 clustered at the top of the peduncle. Peduncle short, curved, clothed with imbricating ovate obtuse bracts. Calyx-lobes short, ovate, ciliate. Corolla-tube about as long as the calyx; lobes 5, ovate-lanceolate, acute, glabrous. Drupe small, ovoid, $\frac{1}{10}$ in. long, 3–5-celled.—*Handb. N.Z. Fl.* (1864) 177; *Cheesem. Man. N.Z. Fl.* (1906) 412. Androstoma empetrifolia *Hook. f. Fl. Antarct.* i (1844) 44, t. 30.

North and South Islands, Stewart Island, Auckland and Campbell Islands: Abundant in hilly and mountainous districts from Cape Colville and Rotorua southwards. Ascends to 4500 ft.; descends to sea-level in Stewart Island and in the Auckland Islands. November–January.

4. **C. Colensoi** *Hook. f. Handb. N.Z. Fl.* (1864) 177.—Stems stout, decumbent or prostrate below; branches 4–18 in. high, erect or ascending, leafy, pubescent at the tips. Leaves erect or erecto-patent, $\frac{1}{4}$–$\frac{1}{3}$ in. long, linear-oblong or narrow obovate-oblong, obtuse or shortly mucronate, glabrous, convex above, glaucous beneath, with 3 or 5 stout parallel veins, the outer of which often branch towards the edge of the leaf; margins often dilated and membranous towards the tip of the leaf, finely ciliolate. Flowers in 3–5-flowered short and stout terminal racemes; bracts 2 or 3, broadly ovate, obtuse. Calyx-lobes concave, obtuse, ciliolate. Corolla-tube longer than the calyx; lobes densely bearded within. Drupe globose, $\frac{1}{5}$ in. diam., white or red.—*Cheesem. Man. N.Z. Fl.* (1906) 412; *Ill. N.Z. Fl.* ii (1914) t. 125. Leucopogon Colensoi *Hook. f. Fl. Nov. Zel.* i (1853) 165.

North Island: Lake Taupo, Tongariro, and Ruapehu, *Colenso! G. Mair! H. Hill!* Ruahine Range, *Colenso!* Kaimanawa and Tararua Mountains, *B. C. Aston!* South Island: Not uncommon on the mountains of Nelson and Canterbury, rare and local in Otago. 2000–5000 ft. December–January.

This was originally placed in *Leucopogon*, and in many of its characters it approaches that genus, although the habit is that of *Cyathodes.*

5. **C. pumila** *Hook. f. Handb. N.Z. Fl.* (1864) 735.—A small depressed densely tufted little plant 2–5 in. high; stems prostrate, with numerous suberect or ascending leafy branches. Leaves imbricate, erect and incurved when dry, shortly petiolate, $\frac{1}{8}$–$\frac{1}{6}$ in. long, linear-oblong, apiculate, glabrous, flat above, glaucous beneath, with a stout midrib and often a lateral vein on each side as well; margins thickened towards the base of the leaf, broad and thin at the tip. Flowers minute, axillary, solitary; peduncles clothed with numerous imbricating broad concave bracts. Calyx-lobes broadly oblong, obtuse, ciliolate. Corolla-tube cylindrical, much longer than the calyx; lobes 5, acute, densely bearded within. Stamens included. Style short, minutely 5-toothed at the tip. Drupe rather large, $\frac{1}{6}$–$\frac{1}{5}$ in. diam., globose, 5-celled.—*Cheesem. Man. N.Z. Fl.* (1906) 413.

North Island: Kaimanawa and Ruahine Mountains, *B. C. Aston.* South Island: Nelson—Mount Arthur, *T. F. C.;* Mount Frederic, near Westport, *P. G. Morgan!* Marlborough—Mount Stokes, *J. H. Macmahon!* Canterbury—Hurunui Mountains, *W. T. L. Travers.* Westland—Kelly's Hill, *Cockayne!* Otago—Summit of Mount Maungatua, *B. C. Aston!* Garvie Mountains, *Poppelwell;* Lake Hauroko, *Crosby Smith.* 2500–5000 ft.

A curious little plant. It is often mistaken for *Pentachondra pumila*, and is probably not uncommon throughout the mountainous districts of the South Island.

3. **LEUCOPOGON** R. Br. 1810.

Erect or prostrate shrubs, or rarely small trees. Leaves scattered or imbricate, sessile or petiolate, striate. Flowers small, white or pink, in axillary or terminal spikes or racemes, sometimes solitary, but the rhachis always ending in the rudiment of an additional flower. Bracts few, usually placed close below the calyx. Calyx 5-partite. Corolla-tube funnel-shaped or campanulate, lobes 5, spreading or recurved, usually densely bearded within. Stamens 5, inserted near the top of the corolla-tube; filaments short, filiform; anthers wholly or partly included in the corolla-tube or in the erect base of the lobes. Ovary 2–3–5-celled; style short or long; stigma small; ovules solitary, pendulous from the top of the cell. Fruit a baccate drupe; mesocarp fleshy; endocarp 2–5-celled; cells 1-seeded.

A large Australian genus of more than 130 species, in addition to which there are a few from the Malay Archipelago and the Pacific islands, and 3 from New Zealand, 2 of which are also Australian.

A shrub 5–15 ft. Leaves linear-lanceolate. Flowers small, in drooping spikes	1. *L. fasciculatus.*
A shrub 4–8 ft. Leaves oblanceolate. Flowers small, in crowded erect spikes	2. *L. Richei.*
Small, 2–8 in. Leaves obovate-oblong, with pungent tips. Flowers large, solitary	3. *L. Fraseri.*

1. **L. fasciculatus** (Forst. f.) *A. Rich. Fl. Nouv. Zel.* (1832) 215.—A branching shrub or small tree 5–15 ft. high or more; bark black; branches slender, spreading, pubescent at the tips. Leaves very variable in size and shape, flat, spreading, $\frac{1}{2}$–1 in. long, linear or linear-lanceolate to obovate-lanceolate or linear-oblong, acute or acuminate or almost pungent, rarely obtuse, sessile, glabrous, 3–7-nerved; margins minutely denticulate or ciliolate. Flowers minute, greenish-white, in 6–12-flowered axillary or terminal

drooping spikes shorter or longer than the leaves. Bracts and calyx-lobes obtuse, striate; margins ciliolate. Corolla-lobes ovate-triangular, acute. Drupe small, $\frac{1}{8}$–$\frac{1}{6}$ in. long, oblong, red.—*A. Cunn. Precur.* (1838) n. 408; *Raoul Choix* (1846) 44; *Hook. f. Fl. Nov. Zel.* i (1853) 164; *Handb. N.Z. Fl.* (1864) 177; *Cheesem. Man. N.Z. Fl.* (1906) 413; *Ill. N.Z. Fl.* ii (1914) t. 126. L. brevibarbis *Sch. in Bull. Soc. Nat. Mosc.* xxxii (1859) i, 14. Epacris fasciculata *Forst. f. Prodr.* (1786) n. 72.

North and South Islands: Abundant from the North Cape as far south as Canterbury. Sea-level to 3500 ft. *Mingimingi.* September–November.

Dr. Cockayne has pointed out ("New Zealand Plants and their Story," p. 200) that in the northern half of the North Island this species passes through a distinct juvenile form with leaves much broader than those of the adult, retaining that form for several years.

2. **L. Richei** *R. Br. Prodr.* (1810) 541.—A slender erect much-branched shrub 4–6 ft. high or more; branches glabrous or slightly puberulous, often fascicled. Leaves $\frac{1}{2}$–1 in. long, linear-lanceolate or oblanceolate, acute or acuminate, narrowed to a sessile base, convex, glaucous beneath, with 3–5 faint nerves; margins recurved. Flowers small, $\frac{1}{8}$ in. diam., white, in subterminal short and dense many-flowered spikes. Bracts striate, barely $\frac{1}{2}$ the length of the calyx. Calyx-lobes oblong, obtuse. Corolla-tube short, not equalling the calyx; lobes linear-oblong, densely bearded within. Drupe broadly ovoid, 3–5-celled.—*F. Muell. Veg. Chath. Is.* (1864) 45; *Hook. f. Handb. N.Z. Fl.* (1864) 735; *Benth. Fl. Austral.* iv (1869) 186; *Cheesem. Man. N.Z. Fl.* (1906) 414.

North Island: Cliffs near the North Cape, *E. Clarke!* Chatham Islands: Not uncommon in sandy soil near the sea, *H. H. Travers: G. Mair! Miss Seddon! Cockayne* and *Cox!*

This is a common plant in extra-tropical Australia and Tasmania; but so far has been found nowhere in the New Zealand area except on the Chatham Islands and on the extreme tip of the North Cape Peninsula.

3. **L. Fraseri** *A. Cunn. Precur.* (1838) n. 409.—A small shrubby plant 2–6 in. high, rarely more, branching from the base; branches decumbent below, erect or ascending above, often curved, leafy, glabrous or minutely puberulous towards the tips. Leaves erect, close-set, imbricating, $\frac{1}{5}$–$\frac{1}{3}$ in. long, obovate-oblong or linear-oblong, suddenly contracted into a fine rigid pungent point, glabrous and shining above, finely nerved beneath, the nerves branching outwards; margins thin, scarious, cartilaginous, finely ciliolate. Flowers axillary and solitary, sessile, large for the size of the plant, $\frac{1}{4}$–$\frac{1}{2}$ in. long, sweet-scented. Bracts minute, broad, apiculate. Calyx-lobes acute. Corolla-tube cylindrical, more than twice as long as the calyx; lobes short, acute, densely bearded within. Drupe large, $\frac{1}{3}$ in. long or more, broadly oblong, yellowish-orange.—*Hook. f. Fl. Nov. Zel.* i (1853) 165; *Handb. N.Z. Fl.* (1864) 178; *Benth. Fl. Austral.* iv (1869) 218; *Cheesem. Man. N.Z. Fl.* (1906) 414. L. nesophilus *DC. Prodr.* vii (1838) 752. L. Bellignianus *Raoul Choix* (1846) 18, t. 12.

North and South Islands, Stewart Island: Abundant in dry heathy places throughout, ascending to 4500 ft. *Totara.* September–January.

Also in Australia and Tasmania. The drupe is juicy, sweetish, and edible.

L. f. var. microphyllus. Satis T. 75: 190,

4. **EPACRIS** Forst. 1776.

Usually erect rigid heath-like shrubs. Leaves sessile or shortly petioled, crowded or imbricated, articulated on the branch, never sheathing. Flowers solitary and axillary, often extending along the branches for a considerable distance, sessile or shortly peduncled, white or red. Bracts numerous, imbricating, clothing the peduncle and concealing the base of the calyx. Calyx 5-partite; corolla-tube cylindric or campanulate; lobes 5, imbricate, spreading. Stamens 5; filaments short, adnate to the corolla-tube; anthers affixed above the middle, wholly or partly included in the corolla-tube. Hypogynous disc of 5 free or rarely connate scales. Ovary 5-celled; ovules numerous, attached to a central placenta. Capsule 5-celled, loculicidally 5-valved. Seeds numerous.

A genus comprising 40 species, all of which are confined to Australia and Tasmania, except the 2 found in New Zealand, and 1 or 2 from New Caledonia.

Three Australian species of *Epacris* (*E. purpurascens* R. Br., *E. pulchella* Cav., and *E. microphylla* R. Br.) have become plentifully naturalized in open "tea-tree country" in several localities near the Manukau Harbour in the vicinity of Papakura and Drury (Auckland District). The first-mentioned was originally discovered by the late Dr. Sinclair and General Bolton nearly seventy years ago, and was included by Sir J. D. Hooker in both the "Flora Novae-Zealandiae" and the Handbook, although he expressed the opinion that it was probably introduced. The two others were first noticed by Mr. A. T. Urquhart (see Trans. N.Z. Inst. xiv (1882) 364, and xxviii (1896) 20). All three species belong to the division of the genus which has the corolla-tube shorter or barely longer than the calyx, and all three have broad acuminate leaves, cordate at the base. *E. purpurascens* can be distinguished by the large leaves with long pungent points and rather large pale-pink flowers, which are usually most abundantly produced.

Erect, 2–8 ft. high. Leaves $\frac{1}{6}$–$\frac{1}{4}$ in., rhomboid-ovate, usually acuminate. Bracts very numerous, acute	1. *E. pauciflora.*
Erect or decumbent, 1–4 ft. Leaves $\frac{1}{8}$–$\frac{1}{6}$ in., broadly elliptical, obtuse. Bracts few, obtuse	2. *E. alpina.*

1. **E. pauciflora** *A. Rich. Fl. Nouv. Zel.* (1832) 213, t. 29.—A slender erect shrub, usually from 3 to 6 ft. high, but occasionally attaining 8–10 ft. or more, sometimes reduced to a few inches; branches often fascicled, erect, leafy, virgate, puberulous at the tips. Leaves suberect, imbricating, $\frac{1}{6}$–$\frac{1}{4}$ in. long, ovate or rhomboid-ovate or oblong-obovate, suddenly narrowed into a bluntly acuminate point, shortly petiolate, concave, very thick and coriaceous, veinless, glabrous on both surfaces. Flowers small, white, copiously produced towards the tips of the branches. Peduncles shorter than the leaves, entirely concealed by numerous imbricating ovate acute bracts, the uppermost of which closely invest the calyx. Corolla-tube hardly longer than the calyx; lobes spreading, broadly oblong, obtuse. Capsule small.—*A. Cunn. Precur.* (1838) n. 411; *Raoul Choix* (1846) 44; *Hook. f. Fl. Nov. Zel.* i (1853) 166; *Handb. N.Z. Fl.* (1864) 179; *Cheesem. Man. N.Z. Fl.* (1906) 415.

Var. **Sinclairii.**—Leaves obtuse, not narrowed into acuminate points.—E. Sinclair *Hook. f. Handb. N.Z. Fl.* (1864) 179.

North and South Islands: Open clay hills from the North Cape to Collingwood and Westport, but rare and local south of the Waikato and Thames Rivers. Sea-level to 2000 ft. Flowers most of the year. Var. *Sinclairii:* Great Barrier Island, *Sinclair! T. Kirk!* Upper Kauaeranga Valley, Thames, *W. Townson!*

E. Sinclairii differs from *E. pauciflora* in no respect except that the leaves are not narrowed into short acuminate points. But the amount of acumination is so variable in *E. pauciflora*, the points being longer and sharper in young plants, and shorter and broader or almost absent in old ones, that I can entertain no doubt as to the specific identity of the two plants.

2. **E. alpina** *Hook. f. Fl. Nov. Zel.* i (1853) 166.—A small erect or spreading rarely decumbent much-branched shrub 1–4 ft. high, seldom more; branches twiggy, densely leafy, puberulous at the tips. Leaves suberect or spreading, small, $\frac{1}{8}$–$\frac{1}{6}$ in. long, broadly elliptical or broadly ovate, obtuse, shortly petiolate, very thick and coriaceous, quite glabrous, concave, veinless. Flowers small, white, numerous towards the tips of the branches. Peduncles short; bracts few, 5–6, broad, obtuse. Calyx-lobes obtuse. Corolla much as in *E. pauciflora*, but smaller.—*Handb. N.Z. Fl.* (1864) 179; *Cheesem. Man. N.Z. Fl.* (1906) 416; *Ill. N.Z. Fl.* ii (1914) t. 127. E. affinis *Col. in Trans. N.Z. Inst.* xx (1888) 199.

North Island: Mount Tauhara, north end of Lake Taupo, *T. F. C.*; between Lake Taupo and the base of Ruapehu, *Colenso*; Tongariro, Ngauruhoe, and Ruapehu, *T. Kirk! H. Hill! T. F. C., Spencer! Cockayne!* and many others; Ruahine and Kaimanawa Mountains, *Tryon! B. C. Aston!* Kaweka Range, *Petrie!* South Island: Nelson—Ngakawau, *Spencer!* Mount Owen and the Buller Valley, *W. Townson! T. F. C.*; Denniston, *W. Caffin!* Canterbury—Southern Alps, *Sinclair* and *Haast* (Handbook). 1000–4000 ft. December–January.

Closely allied to *E. pauciflora*, but distinguished by the smaller size and more spreading habit, smaller obtuse leaves, and fewer obtuse bracts.

5. **ARCHERIA** Hook. f. 1844.

Much-branched erect or spreading shrubs. Leaves flat. Flowers white or pink, in few-flowered terminal racemes. Bracts caducous. Calyx of 5 almost free sepals. Corolla-tube rather broad, ventricose-cylindrical or almost campanulate; lobes 5, short, spreading or recurved, imbricate in the bud. Stamens 5, affixed to the throat of the corolla; filaments very short; anthers broad, attached about the middle. Hypogynous disc short, cupular or of 5 free scales. Ovary 5-celled and deeply 5-lobed; style columnar, inserted in a broad depression at the top of the ovary; stigma dilated, more or less distinctly 5-lobed; ovules numerous in each cell. Capsule 5-celled, loculicidally 5-valved. Seeds numerous.

A small genus of 5 species, confined to New Zealand and Tasmania. It differs from *Epacris* mainly in habit, in the deciduous bracts, and in the position of the style.

Leaves 1–1½ in., obovate-oblong .. .. 1. *A. racemosa.*
Leaves ½–¾ in., lanceolate .. .. 2. *A. Traversii.*

1. **A. racemosa** *Hook. f. Handb. N.Z. Fl.* (1864) 180.—An erect much-branched shrub 6–15 ft. high; bark black; branches spreading. Leaves scattered at intervals so as to appear almost whorled, spreading, 1–1½ in. long, ⅓–½ in. broad, obovate-oblong or elliptic-oblong, acute, sometimes almost pungent, narrowed into a very short petiole or almost sessile, flat, rigid and coriaceous; veins reticulated. Racemes terminating the branches, solitary or 2–3 together, 1–2 in. long, 10–25-flowered; rhachis pubescent; pedicels short, stout, curved. Bracts coloured, caducous; a large leaf-like one at the base of each pedicel, and 2 smaller and narrower ones just below the flower. Sepals oblong-lanceolate; margins membranous, ciliolate. Corolla ⅛ in. long, pink; tube short and broad; lobes short, spreading, ovate-triangular, obtuse. Style short, stout. Capsule small, globose, ⅛ in. diam.—*Cheesem. Man. N.Z. Fl.* (1906) 417; *Ill. N.Z. Fl.* ii (1914) t. 128.

North Island: Great Barrier Island, *Sinclair, T. Kirk!* Little Barrier Island, *Shakespear! T. F. C.*; Thames goldfields, abundant in the Upper Kauaeranga Valley and on several of the mountains to the north and south, *T. Kirk! T. F. C., Adams!*

W. Townson! Te Araroa, near the East Cape, *Bishop Williams!* base of Hikurangi Mountain, *Gerald Williams!* Whanakao Mountain, and source of the Keru River, East Cape, *V. Sherwood!* 500–2800 ft. January–February.

The large concave bracts entirely hide the young racemes, but fall off as soon as the flowers commence to expand.

2. **A. Traversii** *Hook. f. Handb. N.Z. Fl.* (1864) 180. — A large much-branched shrub 6–15 ft. high; bark dark-brown; branches spreading. Leaves scattered, spreading, $\frac{1}{3}$–$\frac{1}{2}$ in. long, lanceolate or linear-lanceolate, acute, thick and coriaceous, quite glabrous, smooth and shining above, midrib distinct beneath; margins recurved, often ciliolate. Racemes terminal, $\frac{1}{2}$–1 in. long, 8–15-flowered; rhachis and pedicels pubescent. Bracts oblong, membranous, caducous, falling away as soon as the flowers commence to open. Sepals oblong, obtuse, striate; margins membranous, ciliolate. Corolla $\frac{1}{8}$–$\frac{1}{6}$ in. long, campanulate, reddish; lobes short, spreading. Style very short, stout. Capsule minute, depressed, $\frac{1}{10}$ in. diam.—*Cheesem. Man. N.Z. Fl.* (1906) 417.

Var. **australis** *Hook. f. l.c.* 735.—Stouter. Leaves longer and broader, $\frac{1}{3}$–$\frac{3}{4}$ in., elliptical-lanceolate or oblong, obtuse or subacute. Flowers rather longer.

South Island: Nelson—Aorere Valley, *W. T. L. Travers;* Mount Arthur Plateau, *T. F. C.;* Brunner Range, *W. Townson!* Canterbury and Westland—Poulter River and Upper Rakaia, *Cockayne;* Bealey Gorge and Arthur's Pass, *T. Kirk! Cockayne! T. F. C.;* Browning's Pass, *Haast!* Rangitaipo, *Petrie!* Mount Arrowsmith, *Cockayne* and *R. M. Laing!* Copeland Pass, *Cockayne.* Otago—Lake Wanaka, *Buchanan!* Clinton Valley, Reece and Hollyford Valleys, *Petrie!* Routeburn, *Poppelwell.* Var. *australis:* Mackinnon's Pass, *F. G. Gibbs!* common in the sounds of the south-west of Otago, *Hector* and *Buchanan!* Stewart Island: Mount Anglem, *T. Kirk!* Sea-level to 4000 ft. January–February.

see Oliver Trans 59: 678

6. **DRACOPHYLLUM** Labill. 1800.

Erect or prostrate shrubs, or more rarely small trees; branches ringed with the scars of the fallen leaves. Leaves crowded at the ends of the branches or imbricate along them, broad and sheathing at the base, above that suddenly contracted into a very narrow-linear rigid or grassy usually concave blade. Flowers small, white or red, in terminal or lateral panicles or racemes or spikes, rarely solitary. Sepals 5, ovate or lanceolate, persistent. Corolla cylindric or campanulate; lobes 5, spreading, imbricate, often incurved at the tips. Stamens hypogynous, or the filaments adnate to the corolla-tube; anthers usually included in the tube, attached at or near the middle. Hypogynous scales 5, free. Ovary 5-celled; style inserted in a depression at the top of the ovary; stigma small, or larger and 5-lobed; ovules numerous, attached to a decurved placenta in the inner angle of the cell. Capsule 5-celled, loculicidally 5-valved. Seeds numerous.

In addition to the 20 species found in New Zealand, all of which are endemic, there are 10 in Australia and Tasmania, and 5 in New Caledonia. The student will find the species exceedingly difficult of discrimination, especially those of section B, where they appear to pass into one another by small gradations, and where the chief distinctive characters available are the highly variable ones of size, habit, and foliage.

A. Flowers panicled. Calyx small, much shorter than the corolla-tube, and always much less than the ripe capsule.

Shrub or small tree 8–20 ft. high. Leaves 10–18 in., 1–1½ in. wide at the base. Panicle terminal, 6–18 in. long. Flowers $\frac{1}{8}$ in. diam. Capsules $\frac{1}{10}$ in. .. .. 1. *D. latifolium.*

Similar to the preceding but much stouter. Leaves 10–24 in., 1–2 in. wide. Panicles denser. Capsules larger, $\frac{1}{8}$ in. diam. .. 2. *D. Traversii.*

B. Umbrales terminal.
(1) Umbrales with few flowers in the lateral umbrales. Anthers included in corolla tube (except Tulcanum).
Group of D. secundum.

29. striatum. - Leaves 60 x 7 mm. Scapes short. Corolla 4 mm.

(2) Panicle compound. Anthers exserted.
(b) Group of D. latifolium. Corolla short, scapes obtuse.

30. latifolium. - Bark rough. Leaves large. Panicles erect. Flowers reddish.
31. Weberwalk. - Bark rough. Leaves small. Panicles decurved. Flowers purple.
32. Graveraki. - Bark smooth, paddle shoots. Branches of panicle at acute angles.
33. Pseudovatum. - Bark mostly, petioles short. Branches of panicle at right angles.

W. Townson! Te Araroa, near the East Cape, *Bishop Williams!* base of Hikurangi Mountain, *Gerald Williams!* Whanakao Mountain, and source of the Keru River, East

3.

B. Panicles terminal.

(1) Panicles with few flowers in the lateral branches. Anthers included in corolla tube (except Thiebautii).
Group of D. secundum.

29. strictum. - Leaves 80 X 7 mm. Sepals short. Corolla 4 mm.

(2) Panicle compound. Anthers exserted.
(b) Group of D. latifolium. Corolla short, sepals obtuse.

30. latifolium. - Bark rough, Leaves large. Panicles erect. Flowers reddish.
31. Mathewsii. - Bark rough. Leaves small. Panicles decurved. Flowers purple.
32. Traversii. - Bark smooth, pedicels short. Branches of panicle at acute angles.
33. recurvatum. - Bark smooth, pedicels short. Branches of panicle at right angles.

(b) Group of D. parviflorus. Leaves long, narrow, acicular.

16. D. parviflorum. - Leaves 20 cm. Dorsal sheath. Leaves with short hairs.
17. D. villosum. - Leaves (10-)20 cm. Corolla short. Leaves with long hairs.
18. D. collinum. - Leaves 40-100 cm. Leaves long, 6 cm. Sepals about 1/2 corolla tube.
19. D. pseudonanum. - Leaves 60-120 cm. Corolla long, 6 cm. Sepals about 1/2 corolla tube.

Hybrids

X D. delamotteanum. - Leaves green, narrow, long acuminate.
X D. pseudonanum. - Leaves green, narrow, long acuminate. Corolla purplish in upper lobes.

(c) Group of D. squarrosum. Leaves broad.

20. D. squarrosum. - Leaves 30 x 3 cm., Inflorescence 10 x 7 cm.
21. D. pubens. - Leaves 40 x 4 cm. Styles.
22. D. viride. - Leaves 35 x 5 cm. Pubescent. Inflorescence 10 x 7 cm.

Hybrid

X D. pseudonanum. - Leaves 30 cm.

(3) Leaves terminal.

Group of D. D. reflexum.

23. D. reflexum. - Leaves 20 cm., recurved.

Hybrids.

X D. viride. - Leaves 30 cm., broad.
X D. squarrosum. - Leaves 30-- cm., narrow.

(4) Flowers in racemes. Leaves deciduous.

Group of D. D. longifolium. Leaves broad.

24. D. longifolium. - Leaves long, plane.
25. D. humboldtii. - Leaves short, thin.

Hybrids

X D. delamotteanum. - Leaves 30-60 cm. Inflorescence or in racemes.
X D. longifolium. - Leaves 40-60 cm., terminal leaves.

(b) Group of D. urvilleanum. Leaves long, narrow, acicular.

16. Urvilleanum. - Leaves 70 mm. Corolla short. Bracts with short sheaths.
17. filifolium. - Leaves 130-160 mm. Corolla short. Bracts with long sheaths.
18. collinum. - Leaves 80-100 mm. Corolla long, 6 mm. Sepals equal to corolla tube.
19. Lessonianum. - Leaves 60-100 mm. Corolla long, 6 mm. Sepals longer than corolla tube.

Hybrids

X vulcanicum. - Leaves short, narrow, base auricled.
X marginatum. - Leaves short, narrow, base not auricled in upper leaves.

(c) Group of D. squarrosum. Leaves broad.

20. squarrosum. - Leaves 50 X 3 mm., juvenile leaves 140 X 7 mm.
21. patens. - Leaves 40 X 6 mm. Thick.
22. viride. - Leaves 55 X 5 mm. Thin. Racemes lax. Juvenile leaves 160 X 8.

Hybrid

X densiflorum. - Leaves 30 mm.

(2) Racemes terminal.

Group of D. recurvum.

23. recurvum. - Leaves 20 mm., recurved.

Hybrids.

X varium. - Leaves 50 mm., broad.
X arcuatum. - Leaves 30-4- mm., narrow.

C. Flowers in racemes. Bracts deciduous.

Group of D. longifolium. Leaves broad.

24. longifolium. - Leaves long, stout.
25. Adamsii. - Leaves short, thin.

Hybrids

X acicularifolium. - Leaves 30-60 mm. Flowers solitary or in racemes.
X insulare. - Leaves 40-60 mm., tomentose above.

Subgenus Eudracophyllum. Flowers panicled.

A. Panicles below the leaves, drooping.

Group of D. Menziesii.

26. Menziesii. - Leaves 100-150 mm. Width 15 mm.
27. Townsoni. - Leaves 170 X 11 mm., to 260 X 14 mm.
28. fiordense. - Leaves 670 X 48 mm.

A REVISION OF THE GENUS *DRACOCEPHALUM*

K.R.R. Oldham, T.L.S., V.59, 1928.

A REVISION OF THE GENUS DRACOPHYLLUM

W.R.B. Oliver, T.N.Z.I., V.59, 1928.

SYNOPSIS OF THE SPECIES

Subgenus Oreothamnus. Flowers solitary or in simple racemes.

A. Flowers mostly solitary, sometimes in few-flowered racemes.

(a) Group of D. minimum. Flowers terminal. Leaves acicular.

1. muscoides. - Leaves 2-3 mm., narrow.
2. minimum. - Leaves 4-6 mm., broad. (Tasmania)
3. prostratum. - Leaves 5-6 mm., broad.
4. pronum. - Leaves 6-12 mm., narrow.
5. politum. - Leaves 10-12 mm., broad, stout.
6. Pearsoni. - Leaves 30 mm., stout. Flowers mostly in few-flowered racemes.

Hybrids

X erectum. - Leaves 7-9 mm., narrow.
X saxicolum. - Leaves 13 mm., broad.

(b) Group of D. rosmarinifolium. Flowers axillary; leaves acicular.

7. rosmarinifolium. - Leaves 30 mm., broad.
8. peninsulare. - Leaves 100-120 mm., narrow.
9. palustre. - Leaves 30 mm., narrow.
10. subulatum. - Leaves 20 mm. Flowers mostly a few-flowered racemes

(c) Group of D. Kirkii. Flowers axillary. Leaves broad, grasslike.

11. Kirkii. - Leaves glabrous.
12. pubescens. - Leaves pubescent. Flowers mostly in few-flowered racemes.

B. Flowers in racemes. Bracts persistent.

(1) Racemes lateral.

(a) Group of D. scoparium. Leaves short, narrow, ciliolate.

13. scoparium. - Leaves 30-60 mm., tomentose above.
14. paludosum. - Leaves 30-40 mm., margins ciliate.
15. arboreum. - Leaves 50-80 mm., juvenil... leaves 100 mm.

:UDRACOPHYLLUM. Flowers panicled.
1. Panicles below the leaves, drooping.

DRACOPHYLLUM, acc. to W. Oliver
OREOTHAMNUS: Fls. solitary, or in simple racemes.
A. Fls. mostly solitary, sometimes in few-fld racemes.
a. Flowers terminal, leaves acicular
muscoides - 2-3 mm., narrow
prostratum - 5-6 mm., broad
pronum - 6-12 mm., narrow
politum - 10-12 mm., broad, stout
Pearsoni - 30 mm., stout. Fls. mostly in few-fld. racemes
b. Flowers axillary; leaves acicular
rosmarinifolium - 30 mm., broad
peninsulare - 100-120mm., narrow
palustre - 30, narrow
subulatum - 20, Fls. mostly in few-fld. racemes.
c. Flowers axillary; leaves broad, grass-like.
Kirkii -glabrous
pubescens - pubescent; fls. mostly in few-fld. racemes.
B. Flowers in racemes; bracts persistent.
1. Racemes terminal - recurvum
11. Racemes lateral.
a. Leaves short, narrow, ciliolate.
scoparium - 30-60 mm., tomentose above
paludosum - 30-40 mm., margins ciliate
arboreum - 50-80 mm., juvenile lvs. 100 mm
b. Leaves long, narrow, acicular.
Urvilleanum - 70 mm.; C. short; bracts short-sheathed
filifolium - 130-160 mm; C. short; bracts long-sheathed.
collinum - 80-100; C. 6 mm.; sepals = corolla tube
lessonianum - 60-100; C. 6 mm.; sepals = corolla tube.
C. Flowers in racemes; bracts deciduous.
longifolium - lvs. long, stout.
adamsii - lvs. short, thin

A REVISION OF THE GENUS DRACOPHYLLUM

W.R.B. Oliver, T.N.Z.I., V.59, 1928.

SYNOPSIS OF THE SPECIES

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UDRACOPHYLLUM. Flowers panicled.
Panicles below the leaves, drooping.
Menziesii - 100-150 mm.; by 15 mm.
Townsoni - 170-by 11 to 260 by 14.
floodense - 670 by 48.
Panicles terminal; anthers included -
strictum
Panicles terminal; anthers exserted.
latifolium - back rough; lvs. large;
panicles erect.
Matthewsii - B. rough, lvs. small;
panicles decurved.
Traversii - B. smooth; panicles acute,
branched.
recurvatum - B. smooth; panicles branched
at right Les.

[illegible] than those of the adults and broader, 4–8 in. long, those of adults 1–3 in. long; upper surface and margins silky-pubescent	12. *D. arboreum.*
Very slender. Leaves small, erect, glabrous, $\frac{1}{3}$–1 in. long. Racemes 3–5-flowered	13. *D. subulatum.*
Stout, spreading, much branched. Leaves spreading, 1–2$\frac{1}{2}$ in. long, $\frac{1}{6}$–$\frac{1}{3}$ in. broad at the base, gradually tapering, evenly pubescent on both surfaces. Racemes 3–5-flowered ..	14. *D. pubescens.*
** Flowers usually solitary.	
Decumbent. Leaves spreading, $\frac{3}{4}$–2 in. long, $\frac{1}{6}$ in. broad at the base, gradually tapering, glaucous, glabrous. Flowers lateral, solitary	15. *D. Kirkii.*
Erect. Leaves $\frac{1}{2}$–2 in. long (2–4 in. in var. *acicularifolium*); blade $\frac{1}{20}$–$\frac{1}{15}$ in. broad, pungent. Flowers lateral	16. *D. uniflorum.*
Stems long and creeping or short and tufted and forming cushion-like masses. Leaves erect and appressed. Flowers almost hidden by the leaves	17. *D. politum.*
Depressed or prostrate, rarely suberect. Leaves $\frac{1}{4}$–1 in., obtuse. Flowers usually terminating short lateral branchlets	18. *D. rosmarinifolium.*
Small, prostrate, laxly or closely branched. Leaves imbricate, $\frac{1}{8}$–$\frac{1}{4}$ in. long, linear-subulate from a broad ovate base. Flower terminal	19. *D. prostratum.*
Small, forming densely compacted tufts a few inches across. Leaves closely imbricate, $\frac{1}{10}$–$\frac{1}{8}$ in. long, tips subulate, usually obtuse	20. *D. muscoides.*

1. **D. latifolium** *A. Cunn. Precur.* (1838) n. 412.—A shrub or small tree 8–20 ft. high or more, with a trunk 4–12 in. diam.; young plants forming slender erect unbranched rods with a tuft of grassy leaves at the top; old ones much branched, the branches often whorled, curving outwards and then ascending, giving the tree a candelabrum-like appearance, closely ringed with the scars of the fallen leaves. Leaves crowded at the tips of the branches, squarrose, spreading and recurved, 10–24 in. long, 1–1$\frac{1}{2}$ in. broad at the dilated sheathing base, gradually tapering into very long slender points, quite glabrous, coriaceous, striate, concave or rarely nearly flat, margins very minutely serrulate. Panicle terminal, 6–18 in. long, much and closely branched, linear-oblong, erect in flower, inclined in fruit,

Leaves broad
Squarrosum
repens
viride

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Shrub 10–20 ft. high. Leaves 6–12 in., $\frac{1}{3}$–$\frac{1}{2}$ in. wide at the base. Panicles small, lateral below the leaves, drooping, 2–3 in. long. Flowers $\frac{1}{6}$ in. long .. .. 3. *D. Townsoni.*

Small much-branched shrub, stem often decumbent below. Leaves 3–8 in. long. Panicles lateral, drooping, 3–6 in. long. Flowers large, $\frac{1}{3}$ in. long .. .. 4. *D. Menziesii.*

Small much-branched shrub. Leaves $1\frac{1}{2}$–4 in. long. Panicles terminal, $1\frac{1}{2}$–4 in. long. Flowers $\frac{1}{5}$–$\frac{1}{4}$ in. .. .. .. 5. *D. strictum.*

3. *Flowers in spike-like racemes or solitary. Calyx almost equalling the corolla-tube or longer than it, always completely enclosing the ripe capsule.*

* Flowers in spike-like racemes.

Shrub 4–15 ft. Leaves patent and recurved, $1\frac{1}{2}$–5 in. long. Racemes lateral, 4–8-flowered .. .. 6. *D. Sinclairii.*

Shrub 1–3 ft. Leaves patent and recurved, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, obtuse. Flowers in terminal bracteate spikes .. .. .. 7. *D. recurvum.*

Leaves erect, 3–10 in. long, sheathing base $\frac{1}{2}$–$\frac{2}{3}$ in. broad. Racemes 6–15-flowered .. .. 8. *D. longifolium.*

Leaves erect, 1–5 in. long, sheathing base $\frac{1}{8}$–$\frac{1}{4}$ in. wide, truncate or auricled at the tip. Racemes 4–12-flowered .. .. 9. *D. Urvilleanum.*

Leaves in many series, erect and appressed, very stout, polished, glabrous, $\frac{3}{4}$–1 in. long. Racemes 3–6-flowered .. 10. *D. Pearsoni.*

Leaves not passing through a juvenile stage different to the adult, erect, $\frac{3}{4}$–3 in. long, silky-pubescent above, margins ciliate with white hairs. Racemes 3–6-flowered .. .. 11. *D. scoparium.*

Leaves of juvenile plants larger than those of the adults and broader, 4–8 in. long, those of adults 1–3 in. long; upper surface and margins silky-pubescent .. .. .. 12. *D. arboreum.*

Very slender. Leaves small, erect, glabrous, $\frac{1}{3}$–1 in. long. Racemes 3–5-flowered .. .. 13. *D. subulatum.*

Stout, spreading, much branched. Leaves spreading, 1–$2\frac{1}{2}$ in. long, $\frac{1}{6}$–$\frac{1}{3}$ in. broad at the base, gradually tapering, evenly pubescent on both surfaces. Racemes 3–5-flowered .. 14. *D. pubescens.*

** Flowers usually solitary.

Decumbent. Leaves spreading, $\frac{3}{4}$–2 in. long, $\frac{1}{6}$ in. broad at the base, gradually tapering, glaucous, glabrous. Flowers lateral, solitary .. .. 15. *D. Kirkii.*

Erect. Leaves $\frac{1}{2}$–2 in. long (2–4 in. in var. *aciculariifolium*); blade $\frac{1}{20}$–$\frac{1}{15}$ in. broad, pungent. Flowers lateral .. .. 16. *D. uniflorum.*

Stems long and creeping or short and tufted and forming cushion-like masses. Leaves erect and appressed. Flowers almost hidden by the leaves .. .. 17. *D. politum.*

Depressed or prostrate, rarely suberect. Leaves $\frac{1}{4}$–1 in., obtuse. Flowers usually terminating short lateral branchlets .. .. 18. *D. rosmarinifolium.*

Small, prostrate, laxly or closely branched. Leaves imbricate, $\frac{1}{8}$–$\frac{1}{4}$ in. long, linear-subulate from a broad ovate base. Flower terminal .. .. 19. *D. prostratum.*

Small, forming densely compacted tufts a few inches across. Leaves closely imbricate, $\frac{1}{10}$–$\frac{1}{8}$ in. long, tips subulate, usually obtuse .. .. 20. *D. muscoides.*

1. **D. latifolium** *A. Cunn. Precur.* (1838) n. 412.—A shrub or small tree 8–20 ft. high or more, with a trunk 4–12 in. diam.; young plants forming slender erect unbranched rods with a tuft of grassy leaves at the top; old ones much branched, the branches often whorled, curving outwards and then ascending, giving the tree a candelabrum-like appearance, closely ringed with the scars of the fallen leaves. Leaves crowded at the tips of the branches, squarrose, spreading and recurved, 10–24 in. long, 1–$1\frac{1}{2}$ in. broad at the dilated sheathing base, gradually tapering into very long slender points, quite glabrous, coriaceous, striate, concave or rarely nearly flat, margins very minutely serrulate. Panicle terminal, 6–18 in. long, much and closely branched, linear-oblong, erect in flower, inclined in fruit,

leaves broad
squarrosum
repens
viride

rhachis and pedicels densely pubescent. Flowers crowded, very numerous, shortly pedicelled, $\frac{1}{8}$ in. diam., reddish. Calyx very small, not $\frac{1}{4}$ the length of the corolla; sepals broadly ovate, acute or obtuse, striate. Corolla campanulate, lobes rather longer than the tube, oblong, obtuse, sharply recurved. Anthers large, oblong, exserted. Capsule small, $\frac{1}{10}$ in. diam., depresso-globose.—*Raoul Choix* (1846) 44; *Hook. f. Fl. Nov. Zel.* i (1853) 167; *Handb. N.Z. Fl.* (1864) 181; *T. Kirk Forest Fl.* (1889) t. 123; *Cheesem. Man. N.Z. Fl.* (1906) 419; *Ill. N.Z. Fl.* ii (1914) t. 129. D. recurvatum *Col. in Trans. N.Z. Inst.* xxi (1889) 92.

Var. **Matthewsii** *H. Carse in Trans. N.Z. Inst.* xlviii (1916) 238.—Smaller in all its parts. Branches more slender, not whorled. Leaves 4–12 in. long, with an extreme breadth of $\frac{1}{2}$–1 in. Panicles 4–12 in. long, inclined. Flowers purplish-red.

North Island: Common in hilly forests from the North Cape southwards to Hawke's Bay and Taranaki.

South Island: Sparingly present along the western coast from Collingwood to Charleston. Sea-level to 3000 ft. *Neinei.* January–February; var. *Matthewsii*, September to October.

2. **D. Traversii** *Hook. f. Handb. N.Z. Fl.* (1867) 736.—Very closely allied to *D. latifolium*, but a larger and much more robust plant, sometimes 30 ft. high, with a trunk 2 ft. in diam. Leaves 1–2 ft. long, 1–2 in. broad at the base, gradually tapering into long almost filiform points, rigid and coriaceous, slightly concave, striated, margins smooth and entire or very obscurely serrulate. Panicle terminal, strict, linear-oblong, much and very closely and densely branched; rhachis and pedicels stout, pubescent. Flowers much as in *D. latifolium*, but rather larger. Capsule larger and on stouter pedicels, $\frac{1}{8}$ in. diam.—*Cheesem. Man. N.Z. Fl.* (1906) 420.

South Island: Nelson—Upper Takaka, Mount Arthur Plateau, *T. F. C.*; locality not stated, *W. T. L. Travers*; Paparoa Mountains, Brunner Range, Mount Glasgow, *W. Townson!* Canterbury and Westland—Arthur's Pass, *J. B. Armstrong! T. Kirk! T. F. C., Cockayne!* Rangitaipo, *Petrie!* Mount Greenland, Franz Josef Glacier, Copeland Pass, *Cockayne*; Jackson's Bay, Haast River, *Haast!* Otago—Routeburn, *Poppelwell.* 2500–4500 ft. January–February.

By far the finest species of the genus. Although very different in appearance from *D. latifolium* it is difficult to point out any character of importance to separate it from that plant apart from the increased size and stoutness, the more rigid leaves, denser panicles, and rather larger capsules. A state of *D. latifolium*, not uncommon on high peaks in the Auckland District, approaches it in foliage and in inflorescence, but not in habit.

3. **D. Townsoni** *Cheesem. Man. N.Z. Fl.* (1906) 420.—A large branching shrub 12–20 ft. high; branches stout, ringed with the scars of the fallen leaves. Leaves crowded at the ends of the branches, very similar to those of *D. latifolium* but smaller, 6–12 in. long, $\frac{1}{3}$–$\frac{1}{2}$ in. broad at the dilated sheathing base, very gradually narrowed into fine slender points, rigid and coriaceous, concave, striate, margins minutely serrulate. Panicles small, lateral below the leaves, much curved and drooping, 2–3 in. long, rather closely branched. Flowers crowded, very shortly pedicelled or almost sessile on the branches of the panicle, about $\frac{1}{6}$ in. long. Calyx small, but almost as long as the tube of the corolla; sepals broadly ovate, obtuse, striate. Corolla campanulate, lobed nearly half-way down; lobes oblong, obtuse, sharply reflexed. Anthers exserted. Capsule small, $\frac{1}{8}$ in. diam., depresso-globose.—*Ill. N.Z. Fl.* ii (1914) t. 130.

D. fiordense

South Island: Nelson—Mount Buckland, Paparoa Mountains, *W. Townson!* Westland—Near the Liverpool Coal-mine, *P. G. Morgan!* Otago—The Hump, *J. Speden!* Altitudinal range 500–3000 ft.

This has the peculiar lateral drooping panicle of *D. Menziesii*, but is a much larger plant, with longer and proportionately narrower more grassy leaves. The corolla is markedly different, being not ½ the size, and deeply lobed nearly half-way down, with the lobes sharply reflexed. In *D. Menziesii*, in addition to the much larger corolla, the lobes are very small, not ¼ the length of the tube.

4. **D. Menziesii** *Hook. f. Fl. Nov. Zel.* i (1853) 168.—A small much-branched shrub, often reduced to a foot or two in height; branches very robust, naked, ringed with the scars of the fallen leaves. Leaves crowded near the ends of the branches, like those of *D. latifolium* but much smaller, spreading and recurved, 3–8 in. long, ½–¾ in. broad at the base, gradually tapering to a fine point, slightly concave, rigid and coriaceous, striate; margins cartilaginous, closely and minutely serrulate. Panicles lateral from below the leaves, 3–5 in. long, sparingly branched and often reduced to a simple raceme, drooping; rhachis and pedicels pubescent. Flowers large, waxy-white, ⅓ in. long, on short curved pedicels. Calyx small, not ¼ as long as the corolla; sepals broadly ovate, subacute, striate. Corolla large, campanulate, tube three or four times as long as the calyx; lobes very short, recurved. Anthers included. Capsule depresso-globose, ⅙–⅕ in. diam.—*Handb. N.Z. Fl.* (1864) 181; *Cheesem. Man. N.Z. Fl.* (1906) 420.

South Island: Canterbury—Ashburton Mountains, *Potts!* (flowers not seen). Otago—Lake district, *Buchanan!* mountains above Lake Harris, *T. Kirk!* mountains to the west of Lakes Wakatipu and Te Anau, *Petrie!* Humboldt Mountains, *Cockayne!* Routeburn, *Poppelwell;* Dusky Bay, *Menzies, Reischek!* Port Preservation, *Lyall.* Stewart Island: Mount Anglem, *T. Kirk! Cockayne.* Ascends to 4500 ft.; descends almost to sea-level in Dusky Sound. December–February.

An exceedingly distinct species, with the largest flowers of the genus. Alpine specimens are sometimes only 1–2 ft. high, with few very stout naked branches bearing a globose head of squarrose leaves.

5. **D. strictum** *Hook. f. Fl. Antarct.* i (1844) 48.—A much-branched shrub; branches bare below, ringed with the scars of the fallen leaves. Leaves erect or spreading, variable in size, 1½–4 in. long, ¼–½ in. wide at the sheathing base, which is not conspicuously broader than the blade, gradually tapering into a rigidly acuminate or pungent point, flat or slightly concave, somewhat glaucous, coriaceous, margins minutely serrulate. Panicles terminal, 1½–4 in. long, narrow, erect or curved or cernuous; rhachis and pedicels glabrous or puberulous. Bracts caducous. Flowers rather numerous, ⅕–¼ in. long, shortly pedicelled, white. Calyx small, about ⅓ the length of the corolla; sepals broadly ovate, acute, finely ciliolate. Corolla narrow-campanulate; lobes short, broadly triangular, with inflexed margins. Anthers included; filaments rather long. Capsule depresso-globose, small, ⅒ in. diam.—*Fl. Nov. Zel.* i (1853) 168; *Handb. N.Z. Fl.* (1864) 181; *Cheesem. Man. N.Z. Fl.* (1906) 181. D. affine *Hook. f. Fl. Antarct.* i (1844) 48; *Fl. Nov. Zel.* i (1853) 168. D. imbricatum *Col. in Trans. N.Z. Inst.* xxv (1893) 331.

North and South Islands: From the Thames River to the south of Otago, not common. In the South Island mainly found on the western side of the Island. Sea-level to 3000 ft. *Totorowhiti.* November–March.

Very variable in the size of the leaves. On young plants or on vigorous shoots they are frequently 4–5 in. long and proportionately broad; but on old plants or in exposed situations they are often reduced to 1½ in. or less.

6. **D. Sinclairii** *Cheesem. Man. N.Z. Fl.* (1906) 421. — A tall erect branching shrub, usually 4–8 ft. high, rarely taller and forming a small tree 12–20 ft. in height; bark brownish-black. Leaves spreading and recurved, suberect when young, often clothing the branches for a considerable length, 1½–5 in. long, ⅙–⅓ in. wide at the sheathing base, which is not truncate nor auricled and not very much wider than the blade, gradually narrowed into long acuminate points, coriaceous or somewhat grassy, concave; margins finely serrulate, ciliolate at the base. Racemes lateral, 1–2 in. long, 4–8-flowered, usually fascicled along the branches some distance below the tip. Bracts persistent, ovate-lanceolate, acuminate. Flowers ¼ in. long, white. Sepals almost equalling the corolla, ovate-lanceolate, acuminate. Anthers included. Style short, stout. Capsule small, concealed by the persistent sepals.—D. squarrosum *Hook. f. Fl. Antarct.* i (1844) 48 (*not of R. Br.*); *Fl. Nov. Zel.* i (1853) 169; *Handb. N.Z. Fl.* (1864) 181.

North Island: From the North Cape as far as the East Cape, but often local, usually near the sea. Ascends to 2500 ft. Flowers most of the year.

Hooker's name is most appropriate, but unfortunately it is preoccupied by an Australian species (*D. squarrosum* R. Br. Prodr. (1810) 556). This was made the type of the genus *Sphenotoma* by Don, but was reunited with *Dracophyllum* by Bentham in the "Flora Australiensis."

7. **D. recurvum** *Hook. f. Fl. Antarct.* i (1844) 50. — A small rather stout much-branched procumbent or prostrate shrub 6 in. to 2 or 3 ft. high; bark blackish-brown; branches naked, ringed with the scars of the fallen leaves. Leaves crowded at the tips of the branches, spreading and recurved, ½–1½ in. long; sheathing base membranous, ⅛–¼ in. broad, ciliolate, suddenly narrowed into a rigid and coriaceous linear-subulate usually much recurved lamina, which is concave on the upper surface and almost keeled beneath, tip obtuse, margins minutely serrulate. Flowers ¼ in. long, in short and stout terminal bracteate spikes ½–1 in. long; bracts numerous, large, persistent, almost concealing the flowers, base broad and foliaceous, tip short, subulate. Sepals ovate-lanceolate, acute, almost as long as the corolla-tube, ciliolate. Corolla narrow-campanulate; lobes short, ovate-triangular, acute. Anthers included. Style very short. Capsule small, ⅛ in. long, shorter than the sepals.—*Fl. Nov. Zel.* i (1853) 171; *Handb. N.Z. Fl.* (1864) 181. D. rubrum *Col. in Trans. N.Z. Inst.* xx (1888) 200. D. tenuicaulis *Col. l.c.* xxii (1890) 476. D. brachyphyllum *and* D. varium *Col. l.c.* xxviii (1896) 602, 604. D. brachycladum *Col. l.c.* xxxi (1899) 275.

North Island: Mount Hikurangi, East Cape district, *Colenso!* slopes of Tongariro, Ngauruhoe, and Ruapehu, and the central volcanic plateau generally, *Bidwill, Colenso! G. Mair, T. Kirk! T. F. C., Cockayne,* and others; Ruahine Mountains, *Colenso! H. Hill! Petrie! B. C. Aston!* Kaimanawa Mountains, *Colenso! B. C. Aston!* and others.

Easily distinguished by the small size, recurved leaves, and short dense terminal spikes with foliaceous bracts. I have examined the type specimens of Mr. Colenso's new species preserved in his herbarium, but fail to see how they can be separated even as varieties.

8. **D. longifolium** *R. Br. Prodr.* (1810) 556.—Very variable in stature, sometimes a shrub from 4 to 8 ft. high, at others forming a small tree 12 to 25 ft. with a trunk 6–15 in. diam.; bark black; branches slender, erect, naked below. Leaves crowded at the tips of the branches, erect, or spreading when young, strict, 3–10 in. long, narrow linear-subulate;

D. patens N.Z.Fl. p. 698. G.L.B. del.

D. viride v. Oliv. 699. Spirits Bay, Peria: Adams (See Herb)
D. longifolium x "rosmarinifolium" Arthur's Pass Trans 59: 727

sheathing base $\frac{1}{3}$–$\frac{2}{3}$ in. long and as wide, brown, striate, margins scarious, ciliate; blade $\frac{1}{8}$–$\frac{1}{6}$ in. broad at the base, gradually tapering into a long acuminate pungent tip, concave, rigid and coriaceous, striate, often pubescent above, margins entire or minutely serrulate. Racemes terminal on short lateral branchlets or rarely ending the main branches, strict, erect or inclined, $1\frac{1}{2}$–$2\frac{1}{2}$ in. long, 6–15-flowered. Bracts numerous, a large foliaceous one at the base of each pedicel and 2–4 equalling the calyx at the base of each flower. Flowers white, $\frac{1}{4}$–$\frac{1}{3}$ in. long. Sepals ovate-lanceolate, acute, ciliate, almost equalling the corolla-tube. Corolla campanulate; lobes ovate-triangular, inflexed at the tip. Anthers included. Capsule $\frac{1}{6}$ in. diam., enclosed within the persistent sepals.—*A. Rich. Fl. Nouv. Zel.* (1832) 219; *A. Cunn. Precur.* (1838) n. 413; *Raoul Choix* (1846) 44; *Hook. f. Fl. Antarct.* i (1844) 45, tt. 31, 32; *Fl. Nov. Zel.* i (1853) 169; *Handb. N.Z. Fl.* (1864) 182; *T. Kirk Forest Fl.* (1889) t. 109; *Cheesem. Man. N.Z. Fl.* (1906) 422. D. Lyallii *Hook. f. Fl. Nov. Zel.* i (1853) 169. Epacris longifolia *Forst. f. Prodr.* (1786) n. 68. Icon. Gen. 20 pl. 10. 1776.

North Island: Mountains of the East Cape district, *Bishop Williams! Adams* and *Petrie!* Ruahine Mountains, *A. Hamilton! B. C. Aston!* Tararua Mountains *Buchanan! Petrie!* South Island: Not uncommon in mountain districts throughout. Stewart Island: Abundant throughout. Auckland and Campbell Islands: Forming a considerable proportion of the ligneous vegetation, *Hooker, T. Kirk! F. R. Chapman!* and others. Sea-level to 4000 ft. *Inanga; Grass-tree.* November–March.

A very variable plant. In its extreme state, which is best seen in the sounds of the south-west coast of Otago, in Stewart Island, and in the Auckland Islands, it forms a tree sometimes 30 ft. in height, with leaves often a foot in length; but in open mountain districts in the South Island it is rarely more than a few feet high, with much shorter and narrower leaves. This form is difficult to separate from some varieties of *D. Urvilleanum;* in fact, there does not appear to be any strict line of demarcation between the two species.

9. **D. Urvilleanum** *A. Rich. Fl. Nouv. Zel.* (1832) 221 (*in part*).—A much or sparingly branched shrub 4–8 ft. high; branches slender, erect; bark black or dark chestnut-brown. Leaves very variable, slender, often flexuous, erect, 1–5 in. long; sheathing base $\frac{1}{8}$–$\frac{1}{4}$ in. broad, brown, striate, membranous, truncate or auricled at the tip, margins scarious, ciliate; blade very narrow, $\frac{1}{20}$–$\frac{1}{10}$ in. broad at the base, coriaceous, concave or canaliculate above, triquetrous or nearly so at the tip, margins minutely denticulate. Racemes on short lateral branchlets, rarely ending the main branches, strict, erect, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, 4–12-flowered. Flowers small, white or red, $\frac{1}{5}$–$\frac{1}{4}$ in. long. Sepals ovate-lanceolate, acuminate, as long as or longer than the corolla-tube. Corolla-lobes rather narrow. Anthers included. Capsule $\frac{1}{8}$–$\frac{1}{6}$ in. diam., enclosed within the persistent sepals.—*Hook. f. Handb. N.Z. Fl.* (1864) 182; *Cheesem. Man. N.Z. Fl.* (1906) 423.

Var. **a.**—Branches long, slender; bark black. Leaves rather short, 1–$2\frac{1}{2}$ in. long, concave above. Racemes 3–6-flowered, lateral, often crowded along the branches for some distance below the tips. Flowers rather small, narrow.—D. Urvilleanum *A. Rich.; A. Cunn. Precur.* (1838) n. 415; *Raoul Choix* (1846) 44; *Hook. f. Fl. Antarct.* i (1844) 49; *Fl. Nov. Zel.* i (1853) 169.

Var. **filifolium** *Cheesem.*—Branches long, slender; bark black or chestnut-brown. Leaves long, $2\frac{1}{2}$–5 in., very narrow, often flexuose, canaliculate above.—D. filifolium *Hook. f. Fl. Nov. Zel.* i (1853) 169. D. setifolium *Stchegel. in Bull. Soc. Nat. Mosc.* xxxii (1859) i, 23. D. virgatum and D. heterophylum *Col. in Trans. N.Z. Inst.* xxviii (1896) 605. (?) D. pungens *Col. l.c.* 602.

D. olivei, Du Rietz Trans. 75: 191

D. Colliniana W.Oliv. in Trans. 59:1929:696
Tinline Valley Park

Var. **Lessonianum** *Cheesem.*—Branches stouter. Leaves 1½–3 in. long, strict, flat above, convex beneath. Racemes 6–12-flowered; flowers usually larger.—D. Lessonianum *A. Rich. Fl. Nouv. Zel.* (1832) 223; *A. Cunn. Precur.* (1838) n. 416; *Hook. f. Fl. Nov. Zel.* i (1853) 170. Some forms of this approach *D. longifolium* very closely.

Var. **montanum** *Cheesem.*—Smaller and stouter, often densely branched. Leaves ¾–2 in. long, erect or spreading, broad at the base and gradually narrowed into the sheath, which is not auricled above. Flowers in stout terminal or lateral spike-like racemes ½–1 in. long; bracts broad, concave. This is allied to *D. scoparium*, and was included in it by Hooker, but the leaves are quite glabrous.

North and South Islands, Stewart Island: Var *a*, abundant on dry hills from the North Cape to Nelson; var. *filifolium*, from the Bay of Islands to Wellington, ascending to 4500 ft. on Mount Egmont and the Ruahine Mountains, &c.; var. *Lessonianum*, from Rotorua southwards to Stewart Island, usually in mountain districts; var. *montanum*, Mount Hikurangi, Tongariro and Ruapehu, Ruahine Mountains, Tararua Mountains, and apparently not uncommon in the mountains of the South Island, from 2500 to 4500 ft.

Since the first edition of this work was published I have received much additional information and material respecting the varieties included under the name of *D. Urvilleanum*. No doubt some botanists will prefer to look upon the varieties as distinct species; but on the whole I am convinced that it is best to treat them as a group composed of closely allied and highly variable forms.

10. **D. Pearsoni** *T. Kirk in Trans. N.Z. Inst.* xvii (1885) 223.—Apparently a stout erect much-branched shrub; branches with the leaves on nearly ½ in. diam. Leaves numerous, close-set, densely imbricating, erect and appressed to the branch, ¾–1 in. long; sheathing base ⅙ in. wide, not auricled nor truncate at the tip, margins ciliate; blade $\frac{1}{20}$ in. wide at the base, linear-subulate, pungent, rounded on the back, flat or convex in front, smooth and polished, glabrous, margins minutely denticulate. Flowers small, ⅕ in. long, in dense 3–6-flowered spike-like racemes ½–¾ in. long. Sepals ovate, acuminate, rather shorter than the corolla-tube, margins ciliate. Corolla-lobes ovate-triangular, acute. Capsule obovoid, included within the persistent calyx-lobes.—*Cheesem. Man. N.Z. Fl.* (1906) 424.

Stewart Island: Not uncommon from almost sea-level to 2500 ft. Mount Anglem and Smith's Lookout, *T. Kirk!* locality doubtful, *Pearson!* Port Pegasus, Mount Remarkable, and many other localities, *Cockayne.*

This appears to differ from *D. Urvilleanum* var. *Lessonianum* in the more numerous densely imbricating closely appressed leaves, but further specimens may prove it to be a form of that plant.

11. **D. scoparium** *Hook. f. Fl. Antarct.* i (1844) 46, t. 33.—A densely branched shrub 4–8 ft. high; bark dark-brown or nearly black. Branches very numerous, stout, rigid, erect; ultimate branchlets more slender, but still strict and erect. Leaves very densely crowded, erect, brownish-green, ½–1½ in. long; sheathing base ⅛–⅙ in. broad, thin, striate, not truncate nor auricled above; lamina $\frac{1}{18}$–$\frac{1}{12}$ in. broad at the base, gradually narrowed upwards into a pungent triquetrous apex, concave above and with the margins silky-pubescent, convex beneath and glabrous. Flowers white, about ¼ in. long, densely packed in 3–6-flowered racemes or spikes. Bracts broadly ovate, acuminate, ciliate on the margins. Sepals ovate, acuminate, ciliate, about equalling the corolla-tube. Corolla-lobes short, triangular, acute. Capsule broadly obovate, included within the persistent calyx-lobes.—*Fl. Nov. Zel.* i (1853) 170. D. Urvilleanum *var.* scoparium *Handb. N.Z. Fl.* (1864) 182 (*in part*).

CAMPBELL ISLAND: Common near the sea, *Hooker, T. Kirk! Cockayne! R. M. Laing! B. C. Aston!*

I now limit this species purely to the Campbell Island plant, of which there appears to be two forms. One has the margins of the leaves conspicuously ciliate and the upper surface densely pubescent, the other has slightly smaller and less pubescent leaves. The differences are so slight that it seems hardly worth while distinguishing them as varieties.

12. **D. arboreum** *Cockayne in Trans. N.Z. Inst.* xxxiv (1902) 318. —A large closely branched shrub or small tree sometimes attaining a height of 30 ft.; trunk short, thick; bark dark-brown; branches fastigiately divided above. Leaves of juvenile specimens up to 8 or even 15 ft. high, much larger than those of the adult, often 8 in. long by $\frac{1}{4}$–$\frac{1}{3}$ in. broad at the base, flat above, slightly convex beneath, more or less striate; margins silky-tomentose above, less so beneath. Leaves of adult plants much smaller and narrower, 1–1$\frac{1}{2}$–3 in. long, strict, erect; sheathing base $\frac{1}{6}$–$\frac{1}{4}$ in. broad, not auricled nor truncate, but shortly narrowed into the blade, margins thin, ciliate with white spreading hairs; blade $\frac{1}{20}$–$\frac{1}{16}$ in. broad, gradually narrowed into a sharp pungent point, rigid and coriaceous, concave and more or less pubescent above, convex and almost glabrous beneath; margins ciliate with whitish silky hairs. Flowers in dense 3–6-flowered spike-like racemes $\frac{3}{4}$–1 in. long. Bracts with a broadly ovate sheathing base with silky-white margins. Flowers much as in *D. scoparium.*—D. latifolium *var.* ciliolatum *Hook. f. Handb. N.Z. Fl.* (1867) 736 (*juvenile state*). D. scoparium *Hook. f. var.* major *Cheesem. Man. N.Z. Fl.* (1906) 425.

Var. **paludosum** *Cheesem.*—Smaller, 3–6 ft. high when adult, and often flowering when less than 6 in. Leaves 1–1$\frac{1}{2}$ in., not longer nor wider in the young state. Racemes short, 2–4-flowered; flowers rather smaller. — D. rosmarinifolium *Buch. in Trans. N.Z. Inst.* vii (1875) 338 (*not of Forst.*). D. paludosum *Cockayne in Trans. N.Z. Inst.* xxxiv (1912) 318. D. scoparium *Hook. f. var.* paludosum *Cheesem. Man. N.Z. Fl.* (1906) 425.

CHATHAM ISLANDS: *D. arboreum* and var. *paludosum* both not uncommon, the latter chiefly in swamps, *Dieffenbach, H. H. Travers! J. D. Enys! F. A. D. Cox* and *Cockayne!*

In the first edition of this work I treated this plant as a variety of *D. scoparium*, to which it is certainly very closely allied. But the remarkable juvenile stage that *D. arboreum* passes through, which has no counterpart in *D. scoparium*, compels me to treat the two plants as distinct. Whether I am correct in placing Cockayne's *D. paludosum* under *D. arboreum* is another matter. If it is argued that the existence of a distinct juvenile stage in *D. arboreum*, coupled with its greater size, is sufficient to keep the two plants apart, then I would suggest that *paludosum* should be treated as a variety of *D. scoparium*, the close affinity of which is generally admitted.

13. **D. subulatum** *Hook. f. Fl. Antarct.* i (1844) 50. — An erect shrub 2–6 ft. high, with long slender twiggy branches leafy at the tips; bark dark red-brown or almost black. Leaves small, strict or flexuose, $\frac{1}{3}$–1 in. long, rarely more; sheathing base $\frac{1}{12}$–$\frac{1}{10}$ in. broad, truncate or auricled at the tip; blade very narrow, $\frac{1}{30}$–$\frac{1}{40}$ in. wide at the base, pungent, rigid and coriaceous, concave or flat above, convex beneath, triquetrous at the tip, glabrous on the margins, most minutely serrulate. Leaves of young plants larger, sometimes $\frac{3}{4}$–1$\frac{1}{2}$ in. long by $\frac{1}{12}$ in. wide at the base, spreading or recurved. Racemes small, lateral, often crowded along the branches, 2–6-flowered. Flowers small, $\frac{1}{10}$–$\frac{1}{8}$ in. long. Bracts with broadly ovate sheathing bases and erect subulate tips. Sepals usually exceeding

the corolla-tube.—*Fl. Nov. Zel.* i (1853) 171; *Handb. N.Z. Fl.* (1864) 182; *Cheesem. Man. N.Z. Fl.* (1906) 425; *Ill. N.Z. Fl.* ii (1914) t. 132.

North Island: From the Upper Thames Valley and Rotorua southwards to Taupo, Ruapehu, and the Ruahine and Kaimanawa Mountains, and eastwards to Tarawera and Mohaka. 350–3500 ft. *Monoao.* November–March.

Easily recognized by its small size and erect slender habit, short very narrow leaves, and small flowers.

14. **D. pubescens** *Cheesem. Man. N.Z. Fl.* (1906) 426. — A small densely branched woody shrub; branches stout, often decumbent below, erect or ascending above; bark dark reddish-brown or almost black. Leaves crowded, spreading or erecto-patent, 1–2½ in. long, $\frac{1}{6}$–$\frac{1}{3}$ in. broad at the sheathing base, which is not much broader than the blade, gradually narrowed to an acuminate and pungent point, coriaceous, concave in front, rounded on the back, glaucous, striate, minutely and evenly pubescent on both surfaces, sometimes becoming almost glabrous when old. Flowers about $\frac{1}{4}$ in. long, in 3–5-flowered spikes terminating short lateral branchlets. Bracts ovate, acuminate; margins ciliate. Sepals ovate or ovate-lanceolate, acuminate, equalling the corolla-tube. Corolla-lobes triangular, acute. Capsule obovoid, included within the persistent calyx-lobes.

South Island: Nelson—Mountains near Westport, *W. Townson!* 1500–2500 ft.

Habit of *D. Kirkii* Berggren, but a larger and stouter and more copiously branched plant, with the leaves finely and equally pubescent on both surfaces, and with the flowers in 3–5-flowered spikes, not solitary. The leaves are very similar in shape to those of small specimens of *D. strictum*, and are quite different to those of *D. Urvilleanum*, *D. scoparium*, and their allies.

15. **D. Kirkii** *Berggren in Journ. Bot.* xviii (1880) 104. — A small depressed woody shrub; branches very stout, 6–18 in. long, prostrate or decumbent, suberect at the tips; bark reddish-brown. Leaves crowded, spreading or suberect, $\frac{3}{4}$–2 in. long, $\frac{1}{6}$ in. wide at the sheathing base, which is not conspicuously broader than the blade, gradually narrowed into an acuminate pungent point, coriaceous, more or less concave, glaucous, quite glabrous, striate; margins very minutely serrulate. Flowers solitary, lateral, $\frac{1}{4}$–$\frac{1}{3}$ in. long, shortly pedicelled. Bracts 2–3, sheathing, the tips often exceeding the flower. Sepals ovate, acuminate, shorter than the corolla-tube, margins minutely ciliate. Corolla-lobes ovate-triangular, acute. Anthers included. Capsule broadly obovoid, $\frac{1}{8}$ in. diam., enclosed in the persistent calyx-lobes.—*Cheesem. Man. N.Z. Fl.* (1906) 426. D. uniflorum *Berggr. in Minneskr. Fisiog. Sallsk. Lund.* (1877) 15, t. 4, f. 1–11 (*not of Hook. f.*).

South Island: Nelson—Cobb Valley and vicinity, *F. G. Gibbs!* Lake Tennyson, *T. F. C.* Canterbury—Mount Torlesse, *Berggren;* Arthur's Pass, *T. Kirk! Cockayne! T. F. C.;* Waimakariri Glacier, *T. F. C.;* Upper Rakaia, *Cockayne;* Mount Arrowsmith, *Cockayne* and *R. M. Laing;* Browning's Pass, *Cockayne;* Ashburton Mountains, *Potts!* Mount Cook district, *T. F. C.* Westland—Kelly's Hill, *Petrie!* Griffin Range, *P. G. Morgan!* Franz Josef Glacier and Copeland Pass, *Cockayne.* 2500–4500 ft. December–February.

A very distinct species. The leaves are quite unlike those of any other species belonging to the same section of the genus, having the sheathing bases not much wider than the blade; but they much resemble those of *D. strictum*, in the section with panicled inflorescence. Its only near ally is *D. pubescens*, which differs in the pubescent leaves and 3–5-flowered spikes.

D. kirkii × prona Arthur's Pass. Trans 59: 727

"D. palustre Cheesem. nom. nud." Oliv. p. 690. is D. virgatum (Cheesem.) Cheesem. Trans. 44 (1912) 53."

16. **D. uniflorum** *Hook. f. Handb. N.Z. Fl.* (1864) 182.—A stout erect shrub 3–6 ft. high; bark dark-brown or almost black. Leaves crowded at the tips of the branches, erect, strict or flexuous, ½–2 in. long; sheathing base $\frac{1}{10}$–$\frac{1}{6}$ in. broad, rounded at the tip but not auricled, margins ciliate; blade $\frac{1}{20}$–$\frac{1}{15}$ in. broad at the base, rigid, coriaceous, pungent, semiterete below, triquetrous above, margin most minutely serrulate. Flowers solitary, lateral, ¼–⅓ in. long, shortly pedicelled. Bracts 3–6, with broad sheathing bases, tips pungent, often exceeding the flower. Sepals ovate-lanceolate, acute, as long as the corolla-tube. Corolla-lobes ovate-triangular, acute. Capsule broadly obovoid, enclosed in the persistent calyx-lobes.—*Cheesem. Man. N.Z. Fl.* (1906) 427. D. acerosum *Berggr. in Minnesk. Fisiog. Sallsk. Lund.* (1877) 15.

Var. **acicularifolium**.—Leaves much longer, 2–4 in., narrowed into long acicular points; sheaths broader, auricled at the tips.—*Cockayne in Rep. Scenery Preserv. Soc.* (1915) 4 (*as a species*).

Var. **virgatum**.—Whole plant purplish-brown. Branches long, very slender, sparingly leafy. Leaves small, ¼–¾ in. long. Bracts with pale membranous margins.—*Cockayne in Trans. N.Z. Inst.* xliv (1912) 53 (*as a species*).

South Island: Abundant in mountain districts from Nelson to Foveaux Strait. Var. *acicularifolium:* Broken River basin, and other localities in the mountains of Canterbury, *T. Kirk! J. D. Enys! T. F. C.* Var. *virgatum:* Westland—Near Kumara, *T. Kirk!* Denniston, *J. Caffin!* 2000–4500 ft. December–March.

Dr. Cockayne has assigned the rank of species to both the varieties, but unfortunately gives no differential characters. My own material is very scanty, and as both plants are closely allied to typical *D. uniflorum* I hesitate to make any change at present.

17. **D. politum** *Cockayne in Bot. Surv. Stewart Is.* (1909) 43.—Exceedingly variable in size and habit of growth. Stems much branched, stout, hard and woody, long and creeping or short and tufted, often forming compact matted cushions sometimes 2 ft. in diam., and almost as much in height. Leaves very numerous, densely imbricated in many series, erect and appressed to the branch, ⅙–⅓ in. long, very thick and coriaceous, almost horny, convex and smooth and polished on the back, concave in front, tips usually obtuse; sheaths broad, clasping the branch. Flowers solitary, terminal, almost hidden by the leaves; bracts numerous. Sepals ovate, acute, rather longer than the corolla-tube; margins ciliate.—D. rosmarinifolium *var.* politum *Cheesem. Man. N.Z. Fl.* (1906) 427.

South Island: Mount Maungatua, near Dunedin, *Petrie!* Stewart Island: Plentiful throughout, *T. Kirk! Cockayne! B. C. Aston! H. Guthrie-Smith!* From almost sea-level to 3500 ft., usually in boggy ground.

D. pronum Oliv. l.c. 686.

18. **D. rosmarinifolium** *R. Br. Prodr.* (1810) 556.—A depressed or prostrate, rarely suberect, much-branched rigid woody shrub 3–12 in. high; branches stout, spreading, leafy at the tips. Leaves erect or spreading, rigid, straight or curved, ¼–¾ in. long; sheathing base short, ⅛ in. wide; blade $\frac{1}{20}$ in. wide at the base, very thick and coriaceous, convex at the back, flat or concave in front, tip trigonous, obtuse or rarely subacute, margins entire or very minutely scabrid. Flowers solitary, terminating the branchlets and often confined to the lateral ones, ⅙ in. long. Bracts numerous, with

broad sheathing bases and subulate tips. Sepals ovate, acute, about as long as the corolla-tube. Corolla-lobes ovate, acute.—*A. Rich. Fl. Nouv. Zel.* (1832) 220; *A. Cunn. Precur.* (1838) n. 414; *Raoul Choix* (1846) 44; *Hook. f. Fl. Nov. Zel.* i (1853) 171; *Handb. N.Z. Fl.* (1864) 183; *Cheesem. Man. N.Z. Fl.* (1906) 427. Epacris rosmarinifolia *Forst. f. Prodr.* (1786) n. 67.

North Island: Tararua Mountains, *Buchanan!* Mount Hector, *Petrie!* South Island, Stewart Island: Abundant in mountain districts throughout. 2500–5500 ft. December–March.

The plant described above as *D. rosmarinifolium* is that identified as the species by Hooker and most New Zealand botanists. But it may not correspond with Forster's *Epacris rosmarinifolia*, which must be taken as the type of the species. The matter is one which cannot be settled without inspection of Forster's specimens, the whole of which are outside the Dominion and beyond my reach.

19. **D. prostratum** *T. Kirk in Trans. N.Z. Inst.* xiii (1881) 384.—A small prostrate species; stems 3–12 in. long, sometimes slender and sparingly divided, sometimes robust and copiously branched, but the branches never so closely compacted as in *D. muscoides*. Leaves imbricating, erect, incurved when dry, $\frac{1}{8}$–$\frac{1}{4}$ in. long; sheathing base short, with broad thin margins, narrowed into a linear-subulate blade, which is obtuse or subacute at the tip, coriaceous, convex at the back, flat or slightly concave in front, curved, margins minutely serrulate. Flowers solitary, terminating the branches, $\frac{1}{6}$ in. long, white. Sepals ovate, subacute, rather shorter than the corolla-tube. Corolla-lobes broadly ovate-triangular.—*Cheesem. Man. N.Z. Fl.* (1906) 428.

South Island: Hooker Glacier, Mount Cook district, *T. F. C.;* mountains above Lake Harris, Longwood Range, *T. Kirk!* Clinton Valley, Blue Mountains, Mount Maungatua, *Petrie!* Altitudinal range 2500–5000 ft.

Differs from *D. muscoides* in the larger size and much more lax habit, and in the longer leaves, which are not so closely imbricated; but some of Mr. Petrie's specimens are almost intermediate.

20. **D. muscoides** *Hook. f. Handb. N.Z. Fl.* (1864) 183.—A small densely tufted rigid little plant, forming rounded masses a few inches in diameter; branches short, densely packed, clothed with minute closely imbricating leaves. Leaves $\frac{1}{10}$–$\frac{1}{8}$ in. long, very thick and coriaceous, rigid, concave; sheathing base about $\frac{1}{2}$ the length, broadly ovate, margins thin; tip short, subulate, polished, semiterete, obtuse or more rarely subacute. Flower solitary, terminal, $\frac{1}{6}$ in. long, white. Sepals ovate, subacute, as long as the corolla. Corolla-tube short and broad, cylindrical; lobes very broad, obtuse or subacute.—*Cheesem. Man. N.Z. Fl.* (1906) 428.

South Island: Otago—Mount Alta and Hector's Col, *Buchanan!* Old Man Range, Hector Mountains, Mount Pisa, Mount St. Bathan's, *Petrie!* Mount Ernest (head of Lake Wanaka), Rock and Pillar Range, Mount Cardrona, *Cockayne!* 4000–6000 ft.

In the "Index Kewensis" this is referred to the Tasmanian *D. minimum;* but, judging from a scrap of that species received from the late Baron Mueller, it differs in the more rigid habit and shorter and more closely imbricated leaves, which are also thicker and not nearly so acute.

see Hosaka : Rev. Haw. Mysine occ. Pabens. Bish

Elingamita johnsoni n.sp.West Is.Three Kings Is Rec
Records Auck. Inst. & Museum.Vol.4.no.2.
Fam. Myrsinaceae. Found :M.E.Johnson Jan.1950.
also see 'Botanical Survey' Baylis.Vol.5.1958.

Family LXXXI. **MYRSINACEAE.**

Trees or shrubs, usually glabrous. Leaves alternate, undivided, generally provided with pellucid glandular dots; stipules wanting. Flowers regular, hermaphrodite or polygamous. Calyx usually inferior, 4–6-lobed or -partite, segments often ciliate. Corolla gamopetalous (rarely polypetalous), segments (or petals) 4–6, contorted or imbricated. Stamens opposite to the corolla-lobes and equal to them in number, free or adnate to the tube. Anthers oblong, 2-celled, sometimes coherent. Ovary usually superior, 1-celled; style single, stigma generally capitate; ovules few or many, inserted on a free central placenta. Fruit a one- to several-seeded drupe or berry. Seeds roundish or angular; albumen copious, sometimes pitted or ruminate; embryo usually transverse.

A family of considerable size (according to the most recent enumeration including over 30 genera and 900 species), widely spread over the warm regions of the globe, rare or absent in temperate climates, except in New Zealand. Economic properties unimportant. The single genus found in New Zealand has a wide range in the tropics of both hemispheres.

SUTTONIA A. Richard. 1832

Undershrubs or small trees; leaves entire. Flowers small, pedicelled, hermaphrodite or dioecious by the absence of one of the sexes, arranged in axillary fascicles or umbels or very rarely solitary. Calyx small, deeply 4–5-fid. Corolla usually of 4–5 distinct petals, but in some of the species the petals slightly cohere at the base. Stamens 4–5; filaments short or almost wanting, attached near the base of the petals; anthers introrse. Ovary superior, 1-celled; ovules 2–4; style wanting or very short; stigma capitate. Fruit small, globose, 1-seeded; albumen horny; embryo cylindrical, transverse.

The genus *Suttonia*, as limited by Carl Mez in the Pflanzenreich (Heft 9), includes 5 of the 8 valid species of *Myrsinaceae* found in the New Zealand area. The remaining 3 are placed by him in the allied genus *Rapanea*. But one of the 3 (*S. australis*) falls within the conception of *Suttonia* as defined by Mez himself, and the remaining 2 lie actually upon the border-line between the two genera. Under these circumstances, I have ventured to include the whole of the species in *Suttonia*. Thus amended, the genus will also include 8 species from the Hawaiian Islands.

A. Petals united at the base (often very slightly in M. salicina).

Leaves 1½–2½ in. long, elliptic or obovate-oblong, usually acute ..	1. *S. kermadecensis.*
Leaves 3–7 in. long, linear or linear-oblong	2. *S. salicina.*

B. Petals quite free.

Tree 10–20 ft. Leaves 1–2 in., oblong or obovate, rather thin, margins undulate. Fruit ⅛ in. diam.	3. *S. australis.*
Tree 10–20 ft. Leaves 1–2½ in., obovate, coriaceous, margins flat. Fascicles many-flowered. Fruit ¼–⅓ in. diam. ..	4. *S. chathamica.*
Shrub 8–15 ft.; branches stout, pubescent. Leaves ½–¾ in., narrow-obovate, coriaceous. Flowers solitary or few together, almost sessile	5. *S. Coxii.*
Shrub 8–15 ft.; branches slender, glabrous. Leaves ¾–1¼ in., obovate, rather thin. Flowers in 2–5-flowered fascicles; pedicels slender, distinct	6. *S. montana.*
Shrub 4–12 ft.; branches spreading, tortuous and interlaced. Leaves ¼–½ in., broadly obovate or obcordate, retuse or 2-lobed..	7. *S. divaricata.*
Trailing or prostrate shrub 4–18 in. long. Leaves small, ¼–⅓ in., broadly oblong or orbicular	8. *S. nummularia.*

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Osaka : Kew. Hav. Mysine occ. Pabens. Bish
Mus. XVI(2) 1940.
is retained, Suttonia, Rapanea rejected

also see

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Shrub 4–12 ft.; branches spreading, tortuous and interlaced. Leaves ¼–½ in., broadly obovate or obcordate, retuse or 2-lobed..	7. *S. divaricata.*
Trailing or prostrate shrub 4–18 in. long. Leaves small, ¼–⅓ in., broadly oblong or orbicular	8. *S. nummularia.*

1. **S. kermadecensis** *Cheesem n. comb.*—A small glabrous tree 8–15 ft. high; bark rough, blackish-brown. Leaves 1½–2½ in. long, elliptic-oblong or obovate-oblong, acute or obtuse, narrowed into petioles ⅙–¼ in. long, entire, coriaceous, glandular-dotted, veins copiously reticulated, margins slightly recurved. Flowers in many-flowered fascicles on the old wood below the leaves, small, 1/10–⅛ in. diam., unisexual; pedicels short, ⅛–⅙ in. long. Calyx minute, 4–5-lobed; lobes short, broad. Corolla divided nearly to the base into 4 or 5 ovate acute lobes, which are fringed on the margins. Anthers nearly as large as the lobes. Female flowers not seen. Fruit globose, ¼–⅓ in. diam., black when fully ripe, 1-seeded.—Rapanea kermadecensis *Mez in Pflanzenr.* Heft 9 (1902) 371. Myrsine kermadecensis *Cheesem. in Trans. N.Z. Inst.* xxiv (1892) 410; *Man. N.Z. Fl.* (1906) 431.

Kermadec Islands: Sunday Island, abundant throughout, *T. F. C., W. R. B. Oliver!* Sea-level to 1500 ft. August.

This and the following species have the petals very slightly connected at the base, and have consequently been included by Mez in *Rapanea*, which only differs from *Suttonia* in the gamopetalous corolla. From geographical and other reasons it seems to me to be far preferable to keep all the New Zealand species in one genus.

(Heward)

2. **S. salicina** *Hook. f. Fl. Antarct.* i (1844) 52.—A small tree 15–30 ft. high, perfectly glabrous in all its parts; bark black or dark-red; branches usually leafy at the tips only. Leaves spreading, 3–7 in. long, ½–¾ in. broad, linear or linear-oblong, obtuse, narrowed into a short stout petiole, quite entire, marked with oblong pellucid glands, veined, margins flat. Flowers in dense many-flowered fascicles on the branches below the leaves, hermaphrodite, 1/10–⅛ in. diam. Calyx 5-lobed; lobes rounded, ciliate. Petals 5, oblong, revolute, very slightly cohering at the base. Stamens 5, affixed to the base of the petals. Drupe oblong, ⅓ in. long, red, 1- or rarely 2-seeded.—*Fl. Nov. Zel.* i (1853) 172, t. 44. Myrsine salicina *Heward in Hook. Lond. Journ. Bot.* i (1842) 283 (*in note*); *Hook. f. Handb. N.Z. Fl.* (1864) 184; *T. Kirk Forest Fl.* (1889) t. 15; *Cheesem. Man. N.Z. Fl.* (1906) 431. Rapanea salicina *Mez in Pflanzenr.* Heft 9 (1902) 370.

North and South Islands: Not uncommon in woods from the North Cape to Marlborough and Westland. Sea-level to 2800 ft. *Toro.* September–December.

Wood dark-red, prettily marked; often employed by cabinetmakers for inlaying.

Allan T. 76 (1947) 596.

3. **S. australis** (*A. Rich*) *Fl. Nouv. Zel.* (1832) t. 38.—A small closely branched tree 10–20 ft. high; bark dark-brown or black, red on the young branches. Leaves alternate, spreading, 1–2 in. long, oblong or obovate-oblong, obtuse, shortly petiolate, thinly coriaceous, glabrous or the midrib puberulous above, veined, dotted with rounded pellucid glands, margins strongly undulate. Flowers crowded in fascicles on the branches below the leaves or axillary, small, 1/15–1/10 in. diam., whitish, unisexual; pedicels short. Calyx small, 4-lobed; lobes sometimes wanting. Petals 4, quite free, revolute. Male flowers with 4 stamens and an abortive ovary: anthers as large or larger than the petals. Female flowers much smaller; anthers smaller, empty. Ovary with a large sessile fringed stigma. Fruit small, rounded, ⅛ in. diam., black when fully ripe.—*Hook. f. Fl. Nov. Zel.* i (1853) 172. Myrsine Urvillei *A. DC. in Trans. Linn. Soc.* xvii (1834) 105; *A. Cunn. Precur.* (1838) n. 405; *Raoul Choix* (1846) 44; *Hook. f. Handb. N.Z. Fl.* (1864) 184; *T. Kirk Forest Fl.* (1889) t. 16;

Cheesem. Man. N.Z. Fl. (1906) 432. M. Richardiana *Endl. in Ann. Wien. Mus.* i (1836) 171. Rapanea Urvillei *Mez in Pflanzenr.* Heft 9 (1902) 371.

North and South Islands, Stewart Island: Abundant in woods from the North Cape southwards. Sea-level to 3000 ft. *Mapau; Tipau.* March–April.

So far as my own observations go, the petals are absolutely free in this species, which cannot therefore be placed in *Rapanea* as that genus is limited by Mez. I have restored A. Richard's name of *australis*, as it clearly has two years' priority over that of *Urvillei*.

(T. v. Thell.)

4. **S. chathamica** *Mez in Pflanzenr.* Heft 9 (1902) 333.—A small tree 10–20 ft. high with dark bark; branches stout, the ultimate ones pubescent with short stiff hairs. Leaves 1–2½ in. long, obovate, obtuse or emarginate at the tip, narrowed into a short stout petiole, entire, thick and coriaceous, glabrous or pubescent along the midrib, flat, glandular-dotted, veins reticulated on both surfaces. Flowers in many-flowered fascicles on the branches below the leaves or occasionally axillary, small, $\frac{1}{10}$ in. diam., unisexual; pedicels $\frac{1}{6}$–$\frac{1}{4}$ in. long, rather stout. Calyx 4-lobed; lobes deltoid, ciliolate. Petals 4, quite free, oblong, obtuse, fimbriate, densely studded with reddish glands. Anthers almost as large as the petals. Ovary 1-celled; stigma sessile, capitate. Fruit globose, $\frac{1}{4}$–$\frac{1}{3}$ in. diam., purplish, 1-seeded.—Myrsine chathamica *F. Muell. Veg. Chath. Is.* (1864) 38, t. 7; *Hook. f. Handb. N.Z. Fl.* (1867) 736; *Cheesem. Man. N.Z. Fl.* (1906) 432.

Chatham Islands: Abundant in woods, *H. H. Travers! F. A. D. Cox* and *Cockayne! Krull* and *Hawkins (fide Mez).* Stewart Island: Wilson Bay and Old Neck, *Petrie* and *Thomson, T. Kirk! Cockayne!* Mutton-bird Islands, *H. Guthrie-Smith!* Long Island, *Poppelwell.* August–September.

Red Hill, Rangitata Trans 57: 72.

5. **S. Coxii** *Cockayne in Trans. N.Z. Inst.* xxxv (1903) 359.—A closely branched shrub 8–15 ft. high; bark rough, dark-brown; ultimate branchlets more or less pubescent with short stiff white hairs. Leaves alternate or crowded on short lateral branchlets, $\frac{1}{2}$–$\frac{3}{4}$ in. long, narrow-obovate, obtuse or emarginate, gradually narrowed into a short petiole, entire, coriaceous, glandular-dotted, veins finely reticulated on both surfaces; margins flat, ciliated when young. Flowers in fascicles of 2 or 3 on the branches below the leaves, rarely solitary in the axils of the leaves, small, almost sessile but the pedicels lengthening in fruit. Calyx 4-lobed; lobes deltoid, ciliate. Petals 4, quite free, obovate-oblong, obtuse, ciliate, marked with reddish glands. Anthers almost as large as the petals. Stigma sessile, capitate. Fruit about $\frac{1}{4}$ in. diam., globose, purplish, 1-seeded.—Myrsine Coxii *Cockayne in Trans. N.Z. Inst.* xxxiv (1902) 318; *Cheesem. Man. N.Z. Fl.* (1906) 433. Trans 44: 43

Chatham Islands: Not uncommon in swampy forests, *F. A. D. Cox* and *Cockayne!* July–August.

Closely allied to the preceding, but distinguished by the smaller size, smaller and proportionately narrower leaves, few-flowered fascicles, and almost sessile flowers. Dr. Cockayne informs me that it has creeping underground stems, which at intervals put up erect branches.

6. **S. montana** *Hook. f. Fl. Nov. Zel.* ii (1855) 334.—A perfectly glabrous shrub or small tree 8–15 ft. high; bark dark red-brown. Leaves alternate, $\frac{3}{4}$–1¼ in. long, narrow-obovate, obtuse or emarginate, gradually narrowed into a short slender petiole, coriaceous or almost membranous, quite glabrous, glandular-dotted, veins reticulated on both surfaces, cuticle

beneath sometimes loose and wrinkled when dry; margins flat or slightly recurved, sometimes obscurely sinuate towards the tip. Flowers in 2–5-flowered fascicles on the branches below the leaves, rarely solitary, small, $\frac{1}{8}$ in. diam., unisexual; pedicels rather slender, about $\frac{1}{6}$ in. long. Calyx 4-lobed; lobes oblong, rounded. Petals 4, quite free, obovate-oblong, obtuse, revolute, ciliate. Anthers nearly as large as the lobes. Female flowers not seen. Fruit globose, $\frac{1}{10}$ in. diam.—*Mez in Pflanzenr.* Heft 9 (1902) 334. Myrsine montana *Hook. f. Handb. N.Z. Fl.* (1864) 184; *Cheesem. Man. N.Z. Fl.* (1906) 433. Myrsine neo-zealandensis *Col. in Trans. N.Z. Inst.* xxii (1890) 479. Suttonia neo-zealandensis *Mez in Pflanzenr.* Heft 9 (1902) 334.

North Island: Ruahine Range and Hawke's Bay, *Colenso!* South Island: Marlborough—Mount Stokes, *J. H. Macmahon!* Nelson—Maitai Valley, *T. F. C.*; near Westport, *W. Townson!* Sea-level to 3000 ft.

Mez keeps up *M. neo-zealandensis* as a distinct species, but an examination of the type specimens in Mr. Colenso's herbarium has convinced me that it cannot be retained even as a variety.

7. **S. divaricata**, *Hook. f. Fl. Antarct.* i (1844) 51, t. 34.—A much-branched shrub 4–12 ft. high, with the habit of a small-leaved *Coprosma*, bark rough, dark-brown; branches spreading, rigid, interlaced, often deflexed at the tips; branchlets usually pubescent. Leaves alternate or fascicled on short lateral branchlets, small, spreading, $\frac{1}{4}$–$\frac{1}{2}$ in. long, broadly obovate or obcordate, obtuse or retuse or 2-lobed at the tip, narrowed into a short petiole, coriaceous, glabrous, glandular-dotted, veins reticulated on both surfaces, cuticle often wrinkled beneath when dry; margins flat or slightly recurved, ciliate when young. Flowers in few-flowered fascicles or solitary, minute, $\frac{1}{12}$–$\frac{1}{10}$ in. diam. Calyx 4-lobed; lobes ovate, obtuse. Petals 4 (rarely 5), quite free, obovate, revolute. Anthers almost as large as the petals. Style short; stigma capitate, lobed or crenate. Fruit depressed-globose, $\frac{1}{6}$ in. diam., purplish.—*Fl. Nov. Zel.* i (1853) 173; *Mez in Pflanzenr.* Heft 9 (1902) 334. Myrsine divaricata *A. Cunn. Precur.* (1838) n. 406; *Raoul Choix* (1846) 44; *Hook. f. Handb. N.Z. Fl.* (1864) 184; *Cheesem. Man. N.Z. Fl.* (1906) 434. Myrsine pendula *Col. in Trans. N.Z. Inst.* xxi (1889) 94.

North and South Islands, Stewart Island, Auckland and Campbell Islands: From Kaitaia and Mangonui southwards, but local to the north of the Waikato River. Sea-level to 4000 ft. August–October.

A very variable plant, but easily recognized by its mode of growth, which much resembles that of a small-leaved *Coprosma*. Mr. F. G. Gibbs sends me specimens of young plants with the leaves toothed towards the tips, collected on Mount Arthur, Nelson.

8. **S. nummularia** *Hook. f. Fl. Nov. Zel.* i (1853) 173, t. 45.—A very small prostrate or trailing shrub, with slender straggling branches 4–18 in. long; bark dark red-brown. Leaves small, spreading, $\frac{1}{4}$–$\frac{1}{3}$ in. long, broadly oblong or obovate to orbicular, obtuse or minutely apiculate, shortly petiolate, coriaceous, glabrous, finely reticulated above, often wrinkled beneath, dotted with numerous rounded pellucid glands; margins slightly recurved, ciliate when young. Flowers minute, solitary or in fascicles of 2 or 3, axillary or on the branches below the leaves. Calyx very small, 4-lobed; lobes ovate, obtuse. Petals 4, quite free, obovate, concave, ciliate. Anthers

almost as large as the petals. Female flowers smaller than the males. Ovary conical, narrowed above; stigma large, irregularly lobed or expanded. Fruit globose, $\frac{1}{5}$–$\frac{1}{4}$ in. diam., bluish-purple.—*Mez in Pflanzenr.* Heft 9 (1902) 335. Myrsine nummularia *Hook. f. Handb. N.Z. Fl.* (1864) 184; *Cheesem. Man. N.Z. Fl.* (1906) 434.

North Island: Summit of Mount Hikurangi, East Cape district, *G. Williams!* base of Mount Ruapehu, *Petrie! Spencer! T. F. C., Cockayne;* Lake Rotoatara, *Colenso!* Ruahine and Kaimanawa Mountains, *Colenso! B. C. Aston!* Upper Rangitikei, *Buchanan!* Mount Holdsworth, *Cockayne;* Tararua Mountains, *Buchanan! Petrie, B. C. Aston.* South Island: From Nelson and Marlborough, but not very common. Stewart Island: Not very common, *T. Kirk, Cockayne.* Usually from 2000 to 5000 ft., but descends to sea-level in Stewart Island. December–February.

See Wall Lec. Cant Mus. 4: 1935: 106.

Family LXXXII. **PRIMULACEAE.**

Perennial or more rarely annual herbs. Leaves all radical, or cauline, and if so, opposite or alternate or whorled; stipules wanting. Flowers hermaphrodite, regular. Calyx usually inferior (half-superior in *Samolus*), 4–9-lobed or -partite. Corolla gamopetalous, with as many lobes as divisions of the calyx, lobes imbricate or contorted. Stamens equal in number to the corolla-lobes and opposite to them, sometimes alternating with staminodia, inserted in the tube or at the base of the corolla; anthers 2-celled, introrse. Ovary superior (inferior in *Samolus*), 1-celled; style short or long, stigma usually capitate; ovules 2 or more, attached to a free central placenta. Fruit a 1-celled capsule, 2–6-valved or dehiscing transversely. Seeds 2 to many, minute, angular; albumen fleshy or horny; embryo small, transverse.

A small family, comprising 28 genera and 350 species; widely spread, but most plentiful on the mountains of the North Temperate Zone, rare in the tropics, the southern species comparatively few. The properties of the family are insignificant; but it includes many well-known garden-plants, as the primrose, oxlip, auricula, Chinese primrose, cyclamen, &c. The sole New Zealand genus is best represented in the Southern Hemisphere, but one of the species is almost cosmopolitan.

SAMOLUS Tourn. 1735

Annual or perennial herbs. Leaves alternate. Flowers white, in terminal racemes or corymbs. Calyx half-superior, 5-fid, persistent. Corolla perigynous, subcampanulate; tube short; limb 5-lobed or -partite. Stamens 5, affixed to the corolla-tube, alternating with as many staminodes; filaments very short. Ovary globose, adnate to the calyx-tube, the tip free; style short; ovules numerous, anatropous. Capsule globose or ovoid, half-inferior, the free part 5-valved, many-seeded. Seeds minute, orbicular or angled; embryo transverse; hilum basilar.

Species 10, one of them almost cosmopolitan, most of the rest inhabiting various parts of the Southern Hemisphere.

(Fruit.)

1. **S. repens** *Pers. Syn.* i (1801) 171.—A glabrous perennial herb; stems 4–12 in. long, erect, ascending, or prostrate from a tufted rootstock, often emitting creeping and rooting stolons from the base. Leaves fleshy, very variable in size and shape, $\frac{1}{6}$–1 in. long, obovate or linear-obovate to linear-spathulate or linear, the lower ones usually broader and petiolate, the upper smaller and narrower and often sessile. Flowers about

¼ in. diam., axillary or in few-flowered terminal racemes; pedicels longer than the leaves. Calyx-tube adnate to about the middle of the ovary, lobes acute. Corolla broad, the tube usually about as long as the calyx-lobes. Capsule broadly ovoid, ⅙–⅕ in. diam.—*F. Muell. Veg. Chath. Is.* (1864) 34; *Benth. Fl. Austral.* iv (1869) 271. S. littoralis *R. Br. Prodr.* (1810) 428; *A. Rich. Fl. Nouv. Zel.* (1832) 185; *A. Cunn. Precur.* (1838) 372; *Raoul Choix* (1846) 44; *Hook. f. Fl. Nov. Zel.* i (1853) 207; *Handb. N.Z. Fl.* (1864) 185; *Cheesem. Man. N.Z. Fl.* (1906) 429. Sheffieldia repens *Forst. Char. Gen.* (1776) 18; *Forst. f. Prodr.* (1786) 67.

Var. **strictus** *Cockayne in Trans. N.Z. Inst.* xlviii (1916) 199.—Stems 5–10 in. high, strict, erect; leaves more or less imbricate, linear or linear-lanceolate, acute.

Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands, Auckland Islands: Common along the coast, in salt marshes and on rocks. November–January. Also in Australia and Tasmania and New Caledonia. The var. *strictus* is almost as widely spread as the type.

Family LXXXIII. SAPOTACEAE.

Trees or shrubs, often with milky juice. Leaves alternate, coriaceous, entire; stipules usually wanting. Flowers regular, hermaphrodite or occasionally polygamous, axillary, solitary or clustered. Calyx inferior, 4–8-lobed or -partite; lobes imbricate. Corolla gamopetalous, hypogynous, tube short, lobes as many or 2–4 times as many as the divisions of the calyx. Stamens inserted on the tube of the corolla and opposite to the lobes, either as many or twice as many as the lobes, sometimes alternating with staminodia. Ovary superior, 2–8-celled; style simple, straight; stigma punctiform, simple or lobed; ovules solitary in each cell, attached to the inner angle. Fruit a 1- to many-celled berry, frequently 1-celled and 1-seeded by abortion. Seeds often with the testa crustaceous and shining; albumen present or wanting; embryo straight, radicle inferior.

A small family, widely distributed in the tropics of both hemispheres, but almost unknown in temperate regions. Genera 35; species not far from 600, many of them imperfectly known. The family includes several species useful to man, the most important being the Malayan *Isonandra gutta*, which produces guttapercha. The star-apple (*Chrysophyllum Cainita*) and the African butter-tree (*Bassia Parkii*) are edible species, and there are several others not so well known. The New Zealand genus is widely spread in tropical countries.

SIDEROXYLON Linn.

Trees or shrubs, glabrous or pubescent. Leaves alternate, coriaceous, exstipulate. Flowers usually small, in axillary fascicles, sessile or pedicelled. Calyx-segments 5, much imbricated, subequal. Corolla subcampanulate; lobes 5, imbricated. Stamens 5, affixed to the throat of the corolla and opposite to the lobes; filaments short or long; anthers ovate or lanceolate. Staminodia 5, alternating with the stamens. Ovary glabrous or villous, 5- or rarely 2–4-celled; style cylindric, short or long. Berry ovoid or globose; seeds often solitary by abortion, sometimes 2–5, usually oblong, compressed; testa hard, crustaceous or bony; albumen fleshy; cotyledons flat, broad, often foliaceous; radicle short.

Species about 90, chiefly found in the tropical regions of both hemispheres.

P. costata var. australe-montana Ham
Blumea 5(1):(1–46) 1942.
See also Blumea 6 (2): 238, 1957.

(T. v. Muell.)

1. **S. novo-zelandicum** *Hemsl. in Kew Bulletin* (1908) 459.—A handsome closely branched tree 25–45 ft. high, rarely more, with a trunk 1–3 ft. diam. Branchlets and petioles more or less lactescent, clothed with appressed pubescence. Leaves 2–4 in. long, elliptic-obovate or oblong-obovate, obtuse, narrowed into petioles $\frac{1}{4}$–$\frac{1}{2}$ in. long, quite entire, coriaceous, shining, glabrous except the petiole and midrib, which are finely puberulous; primary veins parallel, diverging from the midrib almost at right angles. Flowers axillary or from the nodes below the leaves, solitary or more rarely 2 together, small, $\frac{1}{8}$–$\frac{1}{6}$ in. diam., polygamous; peduncles stout, curved, $\frac{1}{4}$–$\frac{1}{2}$ in. diam. Calyx-segments 4 or more rarely 5, broadly oblong or ovate, concave, ciliate. Corolla slightly exceeding the calyx, 4–5-partite to below the middle. Stamens as the corolla-lobes; filaments short, thick. Staminodia subulate. Ovary 4–5-celled. Berry large, 1 in. long, broadly oblong or obovoid. Seeds 1–4, but usually 2–3, almost as long as the fruit, smooth and polished, bony, elliptical, curved.—Achras novo-zelandica *F. Muell. Fragm.* ix (1875) 72. A. costata *A. Cunn. Precur.* (1838) n. 404 (*not of Endl.*). Sapota costata *A. DC. Prodr.* viii (1844) 175; *Hook. f. Fl. Nov. Zel.* i (1853) 174; *Handb. N.Z. Fl.* (1864) 186. Sideroxylon costatum *F. Muell. First Census Austral. Pl.* (1882) 92; *T. Kirk Forest Fl.* (1889) t. 133; *Cheesem. Man. N.Z. Fl.* (1906) 435; *Ill. N.Z. Fl.* ii (1914) t. 133.

North Island: Islands and rocky headlands from the North Cape to the East Cape and Tolaga Bay, not common. (For a fuller list of localities see Ill. N.Z. Fl. ii (1914) t. 133.) Ascends to 1500 ft. on the Little Barrier Island. *Tawapou.*

I have followed the late Baron Mueller and Mr. Hemsley in separating the New Zealand plant from the Norfolk Island species, which has the flowers almost uniformly pentamerous, and generally in pairs. The wood is hard, white, and durable; and the bony seeds were formerly used for necklaces by the Maoris.

Family LXXXIV. OLEACEAE.

Trees or shrubs, often climbing. Leaves opposite, very rarely alternate, simple or 3-foliolate or pinnate, entire or toothed; stipules wanting. Flowers regular, hermaphrodite or unisexual, usually in axillary or terminal cymes or panicles or racemes, rarely clustered. Calyx inferior, usually small; limb 4–5-toothed or -lobed or wanting. Corolla hypogynous, gamopetalous and 4–5-partite, or of 4 free petals, sometimes wanting (always so in the New Zealand species). Stamens 2, inserted on the corolla or hypogynous; filaments usually short; anthers large, 2-celled. Ovary superior, 2-celled; style short or long; stigma entire or lobed; ovules usually 2 in each cell, seldom more, attached to the inner angle. Fruit a drupe or berry, or a 2-valved loculicidal capsule, 2-celled, or by abortion 1-celled. Seeds solitary or 2 in each cell, erect or pendulous; albumen present or absent; embryo straight, radicle inferior or superior.

A family of about 21 genera and almost 375 species, widely spread through most temperate and tropical regions. From an economical point of view it is chiefly important from including the well-known olive, which yields the most valuable of vegetable oils. The various kinds of jasmines and the lilac are common garden-plants belonging to the family. The New Zealand genus is mainly found in the North Temperate Zone, but also occurs in South Africa, Norfolk Island, and Australia.

OLEA Linn. 1735

Trees or shrubs. Leaves opposite, entire or rarely toothed. Flowers small, hermaphrodite or unisexual, in axillary or terminal panicles. Calyx small, 4-toothed or -lobed. Corolla with a short tube and 4 induplicate-

See Johnson, Contrib. N.S.W. Nat. Herb. 2(6): 412. 1957.
Olea = Gymnelaea

valvate lobes, wanting in the New Zealand species. Stamens 2, rarely 4, epipetalous or hypogynous; filaments short; anthers oblong. Ovary 2-celled; style short; stigma obtuse, capitate or 2-lobed; ovules 2 in each cell, pendulous or laterally attached. Fruit a drupe; endocarp bony or crustaceous. Seeds solitary or rarely 2; albumen fleshy; radicle superior.

A genus of about 35 species, scattered through the temperate and tropical regions of the Old World. The New Zealand species constitute the section *Gymnelaea*, characterized by the absence of the corolla, and by the stamens being hypogynous.

* Leaves of young plants broader than those of the adult.

Leaves of adult trees 1½–3 in. × 1–1½ in., elliptic-oblong. Racemes glabrous .. .. 1. *O. apetala.*

** Leaves of young plants narrower than those of the adult.

Leaves 3–6 in. × ¾–1¾ in., lanceolate to ovate-lanceolate. Racemes stout, pubescent, 8–18-flowered .. .. .. 2. *O. Cunninghamii.*
Leaves 2–4 in. × ⅓–¾ in., lanceolate. Racemes slender, glabrous or nearly so, 6–12-flowered .. .. 3. *O. lanceolata.*
Leaves 1½–3½ in. × ¼–⅓ in., linear or linear-lanceolate. Racemes slender, glabrous, 5–10-flowered .. .. 4. *O. montana.*

= Gymnelaea apetala (Vahl) L. Johnson.

1. **O. apetala** *Vahl Symb. Bot.* iii (1794) 3.—A much-branched dioecious shrub or small tree 8–20 ft. high, everywhere perfectly glabrous; bark greyish-brown, thick and furrowed; branches spreading, often tortuous. Leaves very variable, in young plants larger and broader, 3–5 in. long, 2–3 in. broad, broadly oblong or ovate, subacute; of adult trees 1½–3 in. long, 1–1½ in. broad, elliptic-oblong or elliptic-ovate, acute or acuminate, shortly petiolate, coriaceous, glossy, both surfaces slightly rough to the touch, quite entire, midrib prominent. Racemes axillary or on the branches below the leaves, glabrous, 1–1½ in. long, 10–18-flowered; pedicels slender. Flowers minute, 1/10 in. diam., females alone seen. Calyx-lobes unequal. Petals wanting. Ovary 2-celled; stigma large, 2-lobed; lobes spreading. Drupe oblong, ⅓ in. long, red.—*Endl. Prodr. Fl. Ins. Norfl.* (1833) 56; *T. Kirk in Trans. N.Z. Inst.* iii (1871) 165; *Forest Fl.* (1889) tt. 27, 28; *Cheesem. Man. N.Z. Fl.* (1906) 437. ♂ See C. & Moore 1935: 309

North Island: Whangarei Heads, *Buchanan! T. F. C.*; Taranga Islands (Hen and Chickens), Great and Little Barrier Islands, *T. Kirk! T. F. C.*; Fanal Island, *Miss Shakespeare!* Cuvier Island, *T. F. C.*

I have followed Kirk in identifying this with the Norfolk Island plant described by Endlicher, but I have had no opportunity of comparing the two.

= G. cunninghamii (Hook.f.) L. Johnson.

2. **O. Cunninghamii** *Hook. f. Fl. Nov. Zel.* i (1853) 175.—A lofty dioecious forest-tree 30–60 or even 70 ft. high, with a trunk 2–5 ft. diam.; young branchlets pubescent. Leaves coriaceous, very variable; of young plants long and narrow, 6–10 in. long, ⅓–⅔ in. broad, narrow-linear, acute; of adult trees 3–6 in. long, ¾–1¾ in. broad, lanceolate to ovate-lanceolate or oblong-lanceolate, obtuse or subacute, shortly petiolate, glabrous, slightly rough on both surfaces; veins impressed above, somewhat obscure, midrib prominent beneath. Racemes ½–1 in. long, stout, densely pubescent, 8–18-flowered; pedicels short, stout; bracts ovate, concave, deciduous. Flowers minute, apetalous. Calyx unequally 4-lobed. Male flowers with

2 large exserted anthers and an abortive ovary; females with 2 sessile empty anthers and an oblong-ovoid ovary with a large 2-lobed stigma. Drupe $\frac{1}{2}$–$\frac{2}{3}$ in. long, ovoid, 1- or rarely 2-seeded, red.—*Handb. N.Z. Fl.* (1864) 186; *T. Kirk Forest Fl.* (1889) tt. 59, 59A, 59B; *Cheesem. Man. N.Z. Fl.* (1906) 437. O. apetala *A. Cunn. Precur.* (1838) n. 403 (*not of Vahl*).

North Island: Forests from the North Cape to Cook Strait, not common north of the Waikato River. South Island: Marlborough, extremely rare; Pelorus Sound, Kaikoura, Conway River, *J. Rutland!* Sea-level to 2500 ft. *Maire; Maire-rau-nui; Black-maire.* October–November.

Wood dark-brown, often streaked with black; very hard, dense, and heavy; serviceable for any purpose requiring great strength and durability.

= G. lanceolata (Hook.f.) L. Johnson.

3. **O. lanceolata** *Hook. f. Fl. Nov. Zel.* i (1853) 176.—A closely branched round-headed dioecious tree 20–50 ft. high; trunk 1–3 ft. diam.; branches more slender than in *O. Cunninghamii*, often with white bark. Leaves coriaceous, smooth and glossy; of young trees 3–6 in. long, narrow-linear, acuminate; of adult plants 2–4 in., linear-lanceolate to ovate-lanceolate, acute or acuminate, shortly petiolate, glabrous, veins usually prominent on both surfaces. Racemes $\frac{1}{3}$–$\frac{3}{4}$ in. long, very slender, glabrous or nearly so, 6–12-flowered; pedicels long, slender. Flowers minute, apetalous. Calyx unequally 4-lobed. Male flowers with 2 or 4 large exserted anthers. Drupe about $\frac{1}{2}$ in. long, ovoid, red or orange.—*Handb. N.Z. Fl.* (1864) 187; *T. Kirk Forest Fl.* (1889) tt. 60, 61; *Cheesem. Man. N.Z. Fl.* (1906) 438; *Ill. N.Z. Fl.* ii (1914) t. 134.

North Island: Abundant in woods from the North Cape to Cook Strait. South Island: Vicinity of Nelson, Wairoa Valley, *T. Kirk! T. F. C.;* Kaituna and Rai Valley, *J. Rutland!* Sea-level to 2000 ft. *Maire; White-maire.* November–January.

Very close to the preceding, from which it differs in the smaller size and more slender habit, smaller and smoother leaves, and especially in the smaller and much more slender almost glabrous racemes. The wood is very similar to that of *O. Cunninghamii*, and equally durable.

= G. montana (Hook.f.) L. Johnson

4. **O. montana** *Hook. f. Fl. Nov. Zel.* i (1853) 176, t. 46 A and B.—A much-branched round-headed dioecious tree 20–50 ft. high or more; trunk rather slender, 1–2 ft. diam.; bark greyish-brown; branches slender, the younger ones pubescent at the tips. Leaves of young plants 3–6 in. long, $\frac{1}{6}$–$\frac{1}{4}$ in. broad, narrow-linear; of adult trees $1\frac{1}{2}$–$3\frac{1}{2}$ in. long, $\frac{1}{4}$–$\frac{1}{3}$ in. broad, linear or linear-lanceolate, obtuse or acute, very shortly petioled, coriaceous, glabrous, shining; veins very obscure. Racemes axillary or on the branches below the leaves, slender, glabrous, 5–10-flowered; pedicels slender. Flowers minute, apetalous. Calyx unequally 4-lobed; lobes broad, obtuse. Drupe $\frac{1}{4}$–$\frac{1}{3}$ in. long, narrow-ovoid, red.—*Handb. N.Z. Fl.* (1864) 187; *T. Kirk Forest Fl.* (1889) tt. 29, 30; *Cheesem. Man. N.Z. Fl.* (1906) 438.

North Island: Auckland—Mongonui County, at Maungataniwha and Fairburn, *H. Carse!* Whangaroa, *A. Cunningham, Buchanan;* Bay of Islands, *Buchanan!* Whangarei, *T. F. C.;* Cape Brett, *Shakespeare!* Waitakerei Range, *T. F. C.;* Thames goldfields, *Adams!* Upper Waikato to Rangitikei and the Tararua Mountains, *T. Kirk! B. C. Aston! Petrie!* Cape Palliser, *T. Kirk!* South Island: Marlborough—Rai Valley, *J. Rutland!* Nelson—Near Brightwater, *T. Kirk! Ororoo; Narrow-leaved Maire.* November–January.

Family LXXXV. **LOGANIACEAE.**

Herbs, shrubs, or trees. Leaves opposite, usually connected by interpetiolar stipules or by a raised line, simple, entire or toothed. Flowers regular, hermaphrodite or unisexual by abortion. Calyx inferior, 4–5-lobed or -partite; lobes valvate or imbricate or contorted. Stamens 4–5, inserted on the tube of the corolla and alternate with its lobes; anthers 2-celled, with longitudinal dehiscence. Ovary superior, 2-celled or rarely 3–5-celled; style simple; stigma capitate or 2-lobed; ovules 1 or more in each cell. Fruit a 2-celled capsule with septicidal dehiscence, or an indehiscent berry. Seeds 1 or more to each cell; albumen copious; embryo straight, long or short.

Distribution chiefly tropical and subtropical, with a few species in temperate North America and in the South Temperate Zone. Genera 32; species about 350. The family must be considered a dangerous one, including a large proportion of highly poisonous plants. Strychnine is obtained from the seed of *Strychnos nux-vomica*, a common Indian tree; and a substance called *curare*, derived from the bark of two species of *Strychnos*, is used by the South American Indians to poison their arrows.

Herbs. Flowers 4-merous. Corolla-lobes valvate. Capsule didymous, truncate or 2-lobed	1. MITRASACME.
Herbs or shrubs. Flowers 5-merous. Corolla-lobes imbricate. Capsule ovoid or oblong	2. LOGANIA.
Shrubs. Flowers 5-merous. Corolla-lobes contorted. Placentas forming a pulpy mass enclosing the seeds	3. GENIOSTOMA.

1. **MITRASACME** Labill. *1804*

Herbs, generally of small size. Leaves opposite, entire, usually connected by a transverse stipular line or short sheath. Flowers small, either solitary in the upper axils or in clusters or irregular umbels. Calyx campanulate, 4-partite or rarely 2-partite. Corolla campanulate or salver-shaped; lobes 4, valvate. Stamens 4, affixed to the corolla-tube; filaments usually short; anthers included or rarely exserted. Ovary 2-celled; styles 2, usually connate at first, but separating from the base upwards as the flowering advances; stigma capitate or 2-lobed; ovules numerous in each cell, affixed to peltate placentas. Capsule subglobose or ovoid or compressed, truncate or 2-lobed or almost 2-horned at the tip, opening along the inner margin of the carpels. Seeds numerous, subglobose or compressed; testa smooth, reticulate.

A genus of about 30 species, chiefly Australian, but extending northwards into tropical Asia and southwards to New Zealand.

Leaves linear-oblong, ending in a stout bristle	1. *M. novae-zealandiae.*
Leaves narrow-obovate, obtuse	2. *M. montana.*

M. Hookerii, *M. Cheesmanii*, and *M. Petriei* Buch. in Trans. N.Z. Inst. xiv (1882) 348, 349, are species of *Veronica*, and will be found described under that genus.

1. **M. novae-zealandiae** *Hook. f. Handb. N.Z. Fl.* (1864) 737.—A small moss-like densely tufted perfectly glabrous herb, forming rounded patches an inch or two in diameter; branches short, slender, densely compacted. Leaves connate at the base, densely imbricated, $\frac{1}{10}$–$\frac{1}{8}$ in. long, linear-oblong, suddenly narrowed at the tip into a stout bristle, quite entire, rather coriaceous, concave, nerveless; margins conspicuously thickened.

Flowers solitary, terminal, minute, almost concealed by the leaves. Calyx-segments like the leaves. Corolla short and broad; lobes 4, short, obtuse. Stamens 4; filaments very short; anthers broadly oblong, didymous, included. Styles short, free. Capsule oblong, coriaceous, 2-valved at the tip, the valves pointing outwards.—*Cheesem. Man. N.Z. Fl.* (1906) 442.

South Island: Canterbury—Hill's Peak, *Cockayne!* Otago—Dusky Bay, on the mountains, *Hector* and *Buchanan*. Stewart Island: Frazer Peaks, Rakiahua, Smith's Lookout, *T. Kirk!* mountains near Port Pegasus, *Cockayne*, *B. C. Aston!* 800–4500 ft.

Dr. Cockayne's specimens have narrower leaves with shorter bristle-points, and may prove to be a distinct species.

2. **M. montana** *Hook. f. Fl. Tasm.* i (1860) 274, t. 88c, *var.* **Helmsii** *T. Kirk in Trans. N.Z. Inst.* xxii (1890) 445, t. 32.—A small perfectly glabrous perennial herb, forming depressed matted patches 1–3 in. diam. Stems slender, 1–2 in. high; branches weak, straggling. Leaves crowded towards the tips of the branches, opposite, $\frac{1}{8}$–$\frac{1}{6}$ in. long, obovate or obovate-oblong, narrowed into short flat petioles or rarely sessile, quite entire, glabrous, rather thick and fleshy, veinless, margins flat. Flowers solitary, terminal, sessile, almost concealed by the leaves. Calyx deeply 4-partite; segments equal, lanceolate, acute. Corolla-tube broad; lobes short, acute, not $\frac{1}{2}$ the length of the tube. Anthers nearly sessile on the throat of the corolla, broadly ovate. Ovary ovoid; styles 2, quite free but connivent. Capsule small, compressed, 2-lobed, the outer angles produced into curved beaks.—*Cheesem. Man. N.Z. Fl.* (1906) 442.

South Island: Westland—Paparoa Range, *R. Helms! P. G. Morgan!* 3000–4000 ft.

This appears to differ from the type, which is a native of Tasmania, in the more slender habit, usually petiolate leaves, terminal sessile flowers, and 2-lobed capsule. It will probably prove to be a distinct species, but I have had no opportunity of comparing it with Tasmanian specimens.

Sec. W.A.B.O. J. Sc. & Tech.

2. **LOGANIA** R. Br. 1810. nom. cons.

Herbs or small shrubs. Leaves opposite, entire, usually connected by a transverse raised stipular line or short sheath, rarely with minute setaceous stipules. Flowers small, often unisexual, in terminal or axillary cymes or solitary. Calyx 5-partite. Corolla campanulate or with a cylindrical tube; lobes 5, rarely 4, spreading, imbricate. Stamens 5, rarely 4, inserted on the corolla-tube; filaments filiform; anthers included or exserted. Ovary 2-celled; style simple; stigma capitate or oblong; ovules usually several in each cell. Capsule oblong-ovoid or globose, obtuse or shortly acuminate, septicidally 2-valved, valves 2-fid, at length separating from the placentas. Seeds ovoid or more or less peltate.

Species 18, all confined to Australia except the following one, which is very imperfectly known. *L. tetragona* Hook. f. Handb. N.Z. Fl. (1864) 188 and *L. ciliolata* Hook. f. *l.c.* 737 have been proved to be species of *Veronica*, and are now known as *V. dasyphylla* and *V. Gilliesiana* T. Kirk. *L. Armstrongii* Buch. in Trans. N.Z. Inst. xiv (1882) 347, t. 28, f. 3, is *Veronica uniflora* T. Kirk, which see.

1. **L. depressa** *Hook. f. Fl. Nov. Zel.* i (1853) 177.—A small prostrate rigid woody shrub, closely appressed to the surface of the ground;

branches densely interlaced, puberulous. Leaves small, $\frac{1}{8}$–$\frac{1}{4}$ in. long, narrow-obovate to oblong, obtuse, thick and coriaceous, veinless. Flowers minute, solitary or in 3–5-flowered fascicles. Male flowers alone seen. Sepals oblong, obtuse, ciliate. Corolla scarcely longer than the calyx, 5-lobed, bearded at the throat; lobes rounded. Stamens 5, alternating with the corolla-lobes, and affixed near the base of the tube; filaments filiform; anthers large, 2-cleft for half-way up, slightly exserted. Fruit unknown. —*Handb. N.Z. Fl.* (1864) 443; *Cheesem. Man. N.Z. Fl.* (1906) 443.

North Island: Margin of the Onetapu Desert, eastern base of Ruapehu, *Colenso;* vicinity of Waiouru, *Petrie!*

Mr. Petrie's specimens are not in flower, and my description of the flowers, &c., is mostly taken from information supplied to me by Mr. N. E. Brown, of the Kew Herbarium. According to Hooker, it is closely allied to *L. fasciculata*, of the Australian Alps.

3. GENIOSTOMA Forst.

Glabrous shrubs. Leaves opposite, connected by a transverse line or short sheath. Flowers small, in opposite axillary cymes or clusters. Calyx 5-partite; segments acute. Corolla campanulate or almost rotate; lobes 5, spreading, imbricate, usually contorted in the bud. Stamens 5, affixed to the tube or throat of the corolla; filaments short; anthers included or exserted. Ovary 2-celled; style simple; stigma capitate or oblong; ovules numerous in each cell. Capsule globose or oblong, septicidally 2-valved; valves separating from the consolidated placentas and axis. Seeds numerous, small, enveloped by the persistent placentas.

Species about 25, ranging from Madagascar, Mauritius, and the Malay Archipelago to Australia, the Pacific islands, and New Zealand. The single species found in New Zealand is endemic.

1. **G. ligustrifolium** *A. Cunn. Precur.* (1838) n. 401. — A perfectly glabrous much-branched shrub 4–12 ft. high; branches slender, terete. Leaves $1\frac{1}{2}$–3 in. long, ovate or elliptic-ovate, acuminate, shortly petiolate, membranous, quite entire, paler beneath, veins conspicuous. Flowers in short axillary corymbs or fascicles, $\frac{1}{8}$–$\frac{1}{6}$ in. diam., greenish-white; pedicels bracteolate. Calyx-lobes ovate, acuminate, ciliolate. Corolla rotate-campanulate; tube short; lobes spreading or reflexed, bearded within. Ovary subglobose; style very short; stigma 2-lobed. Capsule $\frac{1}{5}$ in. diam., subglobose, mucronate, splitting into 2 boat-shaped valves. Seeds numerous; testa brown, pitted.—*Hook. Ic. Plant.* (1842) t. 430; *Raoul Choix* (1846) 44; *Hook. f. Fl. Nov. Zel.* i (1853) 177; *Handb. N.Z. Fl.* (1864) 189; *Cheesem. Man. N.Z. Fl.* (1906) 444; *Ill. N.Z. Fl.* ii (1914) t. 136. G. rupestre *A. Rich. Fl. Nouv. Zel.* (1832) 207 (*not of Forst. f.*).

Var. **major** *Cheesem.*—Leaves larger, $2\frac{1}{2}$–5 in. long.

Var. **crassum** *Cheesem. in Trans. N.Z. Inst.* xxix (1897) 392.—Leaves smaller and broader, $\frac{1}{2}$–$\frac{3}{4}$ in. long by $\frac{1}{3}$–$\frac{2}{3}$ in. broad, broadly ovate or orbicular-ovate, subacute, rather thick and fleshy when fresh.

North Island: Abundant in lowland situations from the North Cape to Cook Strait. South Island: Marlborough—*Buchanan.* Nelson—Pepin Island, *F. G. Gibbs!* Var. *major:* Three Kings Islands, abundant, *T. F. C.* Var. *crassum:* Cliffs near the North Cape, rare, *T. F. C.* *Hangehange.* September–November.

Family LXXXVI. **GENTIANACEAE.**

Annual or perennial herbs, rarely shrubs, usually glabrous and bitter. Leaves opposite, rarely alternate or whorled, nearly always simple and entire; stipules wanting. Flowers regular, hermaphrodite, solitary or cymose. Calyx inferior, 4–5-lobed or -partite, lobes imbricate. Corolla gamopetalous, hypogynous, 4–5-lobed or -partite, lobes twisted to the right (valvate in *Liparophyllum*). Stamens 4–5, inserted on the throat or tube of the corolla and alternate with its lobes; filaments filiform or dilated at the base; anthers 2-celled, introrse. Ovary superior, 1-celled, or 2-celled by the meeting of 2 intruded parietal placentas; style single, short or long; stigma entire or 2-lobed or 2-lamellate; ovules numerous in each cell. Fruit a 1- or 2-celled capsule with septicidal dehiscence, rarely fleshy or indehiscent. Seeds numerous, small; albumen copious, fleshy; embryo minute.

A large and very natural family, found nearly all over the world, but most abundant in the mountainous regions of the Northern Hemisphere. Genera about 75; species estimated at 750, almost without exception possessing bitter and tonic properties. The yellow gentian (*Gentiana lutea*) produces gentian-root, one of the earliest-known medicines, and still frequently used. Other species of *Gentiana* and of the allied genera *Erythrea, Chlora, Frasera, Sabbatia*, &c., have very similar qualities. Of the 3 genera found in New Zealand, *Gentiana* has the range of the whole family; *Sebaea* occurs in Australia, eastern Asia, and South Africa; while *Liparophyllum* is confined to Tasmania and New Zealand.

* Leaves opposite. Corolla-lobes contorted in bud.

Flowers small. Corolla cylindric; lobes spreading. Ovary 2-celled. Style deciduous	1. SEBAEA.
Flowers large. Corolla campanulate or rotate. Ovary 1-celled. Style persistent	2. GENTIANA.

** Leaves alternate or tufted. Corolla-lobes induplicate-valvate.

Small herb with linear tufted leaves. Fruit fleshy	3. LIPAROPHYLLUM.

1. **SEBAEA** R. Br. 1810

Erect glabrous annual herbs. Leaves small, opposite, sessile. Flowers small, yellow, in terminal dichotomous cymes. Calyx 4–5-partite; segments often keeled or winged. Corolla-tube cylindric; lobes 4–5, spreading, contorted in the bud. Stamens 4–5, affixed to the throat or tube of the corolla; filaments short; anthers oblong, introrse, straight or recurved at the tips. Ovary completely 2-celled, placentas large, adnate to the septum; style filiform; stigma clavate or capitate. Capsule globose or ovoid, septicidally 2-valved. Seeds numerous, minute; testa reticulated.

A genus comprising about 50 species, found in tropical and southern Africa, Madagascar, the Himalayas, Australia, and New Zealand. The single New Zealand species is also Australian.

1. **S. ovata** *R. Br. Prodr.* (1810) 452. — A simple or sparingly branched annual herb 4–8 in. high; stems 4-angled. Leaves few, in distant pairs, sessile, $\frac{1}{4}$–$\frac{1}{2}$ in. long, broadly ovate or orbicular-ovate, obtuse or subacute. Flowers small, $\frac{1}{4}$ in. long, pale-yellow, in a terminal dichotomous cyme, with a flower in each axil. Calyx-segments 5, ovate-lanceolate, acute, keeled. Corolla with a long straight tube and 5 short lobes which are twisted after flowering. Anthers linear-oblong, with a gland at the tip.

Style short. Capsule oblong.—*Hook. f. Fl. Nov. Zel.* i (1853) 179; *Handb. N.Z. Fl.* (1864) 191; *Cheesem. Man. N.Z. Fl.* (1906) 445. S. gracilis *A. Cunn. Precur.* (1838) n. 400.

North Island: Bogs at Mangamuka, Hokianga, *R. Cunningham;* Hawke's Bay, *Colenso! A. Hamilton! Tryon!* Wellington—Swampy places at Wanganui, *A. Allison!* raised beaches at Cape Turakirae, *B. C. Aston* and *T. F. C.!* South Island: Canterbury—Near Christchurch, *J. B. Armstrong;* Lake Ellesmere and other localities on the Canterbury Plains, *T. Kirk!* Akaroa, *Lyall!* Otago—Locality not stated, *Buchanan!*

Apparently rare and local in New Zealand, but common in many parts of Australia.

2. GENTIANA Linn. 1735

Annual or perennial herbs. Leaves opposite. Flowers axillary and terminal, solitary or cymose, usually conspicuous. Calyx tubular or cup-shaped, 5- or rarely 4-lobed. Corolla subrotate or campanulate or tubular or funnel-shaped; lobes 5–4, in species not found in New Zealand often with folds between the lobes. Stamens 5–4, inserted on the corolla-tube, included; anthers oblong or ovate. Ovary 1-celled, with 2 parietal placentas; style short or almost wanting; stigmas 2, persistent, recurved; ovules numerous. Capsule stalked or sessile, ellipsoid to narrow-oblong, 2-valved to the base. Seeds small, globose or oblong.

A large and beautiful genus, probably including not far from 350 well-ascertained species. It is most abundant in the temperate and alpine regions of the Northern Hemisphere, extends along the chain of the Andes throughout South America, is sparingly found in Australia and Tasmania, and is plentiful in New Zealand, except in the northern half of the North Island. The species are in all countries highly variable and difficult of discrimination, but nowhere more so than in New Zealand, where they are peculiarly unstable, presenting a bewildering multitude of closely allied forms, to arrange which systematically is a most perplexing task. The late Baron Mueller solved all difficulties by uniting the whole of the Australian and New Zealand species, together with several from South America, under Forster's *G. saxosa;* but this extreme view has not received the sanction of any other botanist of repute, and is entirely repudiated by New Zealand workers. The first serious attempt to deal with the New Zealand forms as a whole was that made by Mr. Kirk in his "Revision" (Trans. N.Z. Inst. xxvii (1895) 330), in which 10 species were admitted. In the first edition of the Manual, and after obtaining a personal acquaintance with most of the species, and after the study of large suites of specimens from all parts of the Islands, I ventured to increase the number to no less than 18; in some cases with considerable hesitation, but the arrangement then made has been acquiesced in by local botanists. Since then several other species have been described, notably by Mr. Petrie, so that the number in the present enumeration is 24. It is somewhat remarkable that the whole of these are apparently confined to the Dominion.

Owing to their extreme variability, the student will find it difficult to identify the species until he has collected a large series of specimens from widely separated localities, and has thus become acquainted with the range and trend of variation. I must here again mention the assistance given to me in preparing the previous edition by Mr. N. E. Brown, who kindly compared many of my specimens with those at Kew and in the British Museum Herbarium. This assistance I have now again found to be of great importance.

A. Annual, dwarf, 1–3 in. high. Flowers solitary at the tips of the branches. Calyx-lobes broadly ovate.

Stems simple or sparingly branched. Leaves mostly cauline, $\frac{1}{6}$–$\frac{1}{3}$ in. long. Flowers $\frac{1}{3}$ in. diam. .. .. 1. *G. filipes.*

B. Perennial, dwarf, 1–4 in. high. Flowers solitary, terminating naked scapes. Calyx-lobes linear-subulate.

Stems densely tufted. Leaves nearly all radical, narrow-linear, $\frac{1}{4}$–$\frac{1}{2}$ in. Flowers $\frac{1}{3}$–$\frac{1}{2}$ in. long .. .. 2. *G. lineata.*

Stems forming dense clumps. Radical leaves spathulate, $\frac{1}{3}$–$\frac{3}{4}$ in. Cauline leaves linear. Flowers $\frac{1}{2}$–$\frac{3}{4}$ in. .. . .. 3. *G. Gibbsii.*

C. Annual, slender, 3–14 in. high. Leaves mostly cauline. Flowers ⅓–½ in. diam. Calyx-lobes linear-subulate.

Stems weak, sparingly branched. Leaves oblong-spathulate, thin — 4. *G. Grisebachii.*

D. Perennial, rarely annual, erect. Radical leaves usually rosulate, crowded; cauline few, in distant pairs, sessile. Flowers large, ¾ in. diam. or more, rarely less, in terminal cymes or umbels, rarely solitary.

Annual. Flowering stems 6–12 in., sometimes with decumbent branches from the base. Radical leaves ½–1¼ in., ovate or ovate-oblong, membranous. Flowers rather small, in involucrate umbels .. — 5. *G. chathamica.*

Annual. Flowering stems 9–18 in., simple or branched. Radical leaves usually rosulate, 1–4½ in., obovate-oblong to spathulate, membranous; cauline in remote pairs. Flowers in involucrate umbels .. — 6. *G. tenuifolia.*

Annual. Flowering stems simple, 8–14 in. Radical leaves few or many, ¾–2 in., ovate or oblong-ovate, rather thin; cauline leaves small. Flowers ¾ in. — 7. *G. terticaulis.*

Perennial. Flowering stems usually single, often tall and stout, 10–24 in. Radical leaves ¾–1½ in., obovate-spathulate; cauline broadly ovate, often cordate at the base — 8. *G. montana.*

Perennial, much branched, forming sward-like patches. Flowering stems numerous, 3–6 in. Leaves narrow-spathulate or lanceolate, dark-green. Flowers small, ⅓–½ in. — 9. *G. gracilifolia.*

Perennial. Flowering stems usually single, very slender, 6–20 in. Leaves black when dry; radical ½–1 in., ovate-lanceolate; cauline 2–5 remote pairs — 10. *G. Townsoni.*

Usually perennial. Flowering stems single, less rarely branched from the base, stout, erect, 6–20 in. Leaves yellow-green when dry; radical 1½–4 in., linear- or oblong-spathulate; cauline 1–2 distant pairs, linear-oblong. Calyx short — 11. *G. corymbifera.*

Habit of *G. corymbifera*, but much smaller. Flowering stems 4–10 in. high. Radical leaves few, ½–1½ in.; cauline 2–4 pairs. Flowers small — 12. *G. serotina.*

Flowering stems 1 or several, often decumbent below, 5–20 in. Radical leaves 1–3 in., oblong-spathulate; cauline 1–5 opposite pairs. Flowers in lax corymbose cymes or umbels — 13. *G. patula.*

Perennial; root long, slender. Flowering stems 4–10 in. high, decumbent below. Radical leaves numerous, crowded, ½–1¼ in., oblong-spathulate, dark-green, polished and shining, coriaceous. Cauline leaves numerous. Flowers large, ½–¾ in., 2–7-flowered umbels .. — 14. *G. vernicosa.*

Flowering stems several, short, 1–6 in. Radical leaves ½–1½ in., spathulate or linear-spathulate. Flowers large, in 2–6-flowered cymes or solitary — 15. *G. bellidifolia.*

Apparently perennial; root stout. Flowering stems single or many. Radical leaves numerous, ½–1 in., thin and membranous, oblong to ovate. Flowers solitary, terminal, ½–¾ in. long — 16. *G. flaccida.*

Flowering stems excessively branched from the base, often forming rounded masses 2–6 in. diam. Radical leaves 1–3 in., oblong or obovate-spathulate. Flowers in dense corymbose cymes — 17. *G. divisa.*

E. Perennial. Stems numerous, variable in habit, erect or spreading or even entangled or trailing; much branched, 6–12 in. or even 18 in. long. Leaves linear-spathulate. Flowers large, ½–¾ in.

Flowers freely produced, terminal, or axillary to the upper leaves. Calyx-lobes subulate — 18. *G. Astoni.*

F. Annual, erect. Radical leaves numerous, rosulate, obovate-spathulate; cauline few, petiolate. Flowers in 2–5-flowered involucrate umbels.

Flowering stems several, 4–10 in. Flowers small, ⅓–½ in. diam. Calyx equalling the corolla or nearly so — 19. *G. Spenceri.*

G. Prostrate or decumbent or suberect, leafy. Leaves spathulate; cauline numerous, petiolate. Flowers in few-flowered cymes or clustered at the ends of the branches.

Perennial, prostrate at the base. Leaves ¾–1¾ in., linear-spathulate, long-petioled. Calyx much shorter than the corolla; lobes recurved at the tip .. .. 20. *G. saxosa.*
Perennial, prostrate at the base, 4–14 in. Leaves ½–1½ in., obovate-spathulate, fleshy, shining. Calyx almost equalling the corolla; lobes not recurved .. .. 21. *G. cerina.*
Annual, ascending or erect, 1–4 in. Leaves ⅓–1 in., linear-oblong. Calyx almost equalling the corolla .. .. 22. *G. concinna.*

H. Stout, erect, 3–10 in. high, fastigiately branched, densely leafy. Flowers small, ⅓ in. long, almost hidden by the cauline leaves and bracts.

Annual. Radical leaves 1–2 in., oblong or oblong-spathulate .. 23. *G. antarctica.*
Perennial. Radical leaves ¾–1¼ in., lingulate or linear-spathulate 24. *G. antipoda.*

1. **G. filipes** *Cheesem. in Trans. N.Z. Inst.* xxviii (1896) 536.—A small annual herb 1–3 in. high; stems slender, erect, simple or branched from the base, sparingly leafy. Leaves mostly cauline, few, small, ⅙–⅓ in. long, oblong- or obovate-spathulate, obtuse or subacute, sessile or the lower ones narrowed into short flat petioles. Flowers solitary, terminating the branches, large for the size of the plant, ⅓ in. diam., white. Calyx broad, tube ⅛ in. long; lobes ⅕ in., broadly ovate, acute. Corolla subrotate, divided about half-way down; lobes ovate, subacute. Stamens more than ½ as long as the corolla; anthers oblong. Ovary linear-obovoid.—*Man. N.Z. Fl.* (1906) 448.

South Island: Slopes of Mount Arthur, Nelson, 4000–5000 ft., *T. F. C., F. G. Gibbs!*

This keeps its characters well in the only locality in which I have seen it.

2. **G. lineata** *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 334, t. 27.—A small densely tufted perennial herb 2–3 in. high, often forming a compact sward; rootstock branched above. Leaves all radical or crowded on very short branches, erect ½–¾ in. long, $\frac{1}{25}$–$\frac{1}{15}$ in. broad, linear or narrow linear-spathulate, acute or obtuse, gradually narrowed into a slender flat petiole, sheathing at the base. Scapes 1–3 in. long, slender, wiry, erect, naked or with 1 or 2 pairs of linear leaves at the very base. Flower solitary, ½–⅔ in. long. Calyx-tube $\frac{1}{10}$ in. long; lobes $\frac{3}{10}$ in., linear-subulate tapering to an acute or almost acuminate tip. Corolla narrow-campanulate, cut down ⅔ of the way to the base into 5 ovate acute lobes. Stamens ⅔ as long as the corolla.—*Cheesem. Man. N.Z. Fl.* (1906) 536.

South Island: Otago—Crest of the Longwood Range, *T. Kirk!* Blue Mountains, *Petrie!* Stewart Island: Exact locality not stated, *Petrie! Cockayne! B. C. Aston!* Sea-level to 3500 ft. January–March.

A curious little plant, easily recognized by the peculiar habit, very narrow leaves, and naked scapes bearing a rather large solitary flower.

3. **G. Gibbsii** *Petrie in Trans. N.Z. Inst.* xlix (1917) 52.—Said to be annual, but the few specimens I have seen might well be perennial. Closely allied to *G. lineata*, but differing in the larger size, larger and more fleshy leaves, stouter scapes, and much larger flowers. Stems many from the top of a long slender root, densely and copiously branched, stiff, erect, 2–5 in. high. Radical leaves ovate-spathulate, ½–¾ in. long. Cauline leaves in 1 or 2 opposite pairs, ⅓–½ in. long, linear-oblong, sessile, acute. Flowers abundantly produced, terminating the branches, large for the

size of the plant, ½–¾ in. long, white. Calyx large, more than ¾ the length of the corolla, cut down almost to the base into 4 narrow-linear subulate lobes, which are sharply acute. Corolla divided to about ⅘ of its length into ovate-lanceolate acute and apiculate veined segments. Stamens ½ the length of the corolla. Capsule exceeding the corolla when mature.

Stewart Island: Mount Anglem, *F. G. Gibbs!*

Much more complete material is required before a really good description can be prepared. It is quite possible that it may be simply a large state of *G. lineata.*

4. **G. Grisebachii** *Hook. f. in Hook. Ic. Plant.* (1844) t. 636.—A slender much or sparingly branched annual herb; root weak, often filiform; stems branching from the base, very slender, decumbent or suberect, 3–14 in. long, rarely more. Lower leaves narrowed into slender petioles as long or longer than the blade, ½–1 in. long, spathulate or oblong-spathulate, rather thin and membranous, obtuse; cauline usually smaller, remote, sessile or shortly petiolate, oblong or ovate-oblong, obtuse or subacute. Flowers few or many, terminal and solitary at the tips of the branches, rather small, ⅓–⅔ in. long, white. Calyx divided ¾-way down or more, often somewhat angled at the base; lobes linear or linear-subulate, acuminate, midrib distinct. Corolla narrow-campanulate, divided more than half-way down; lobes narrow-ovate or oblong, acute. Stamens about ⅔ the length of the corolla. Ovary linear-oblong, often shortly stipitate.—*Cheesem. Man. N.Z. Fl.* (1906) 448. G. montana *Hook. f. Fl. Nov. Zel.* i (1853) 178; *Handb. N.Z. Fl.* (1864) 190 (*not of Forst.*).

Var. **Matthewsii** *Petrie.*—Stems stouter and more erect. Leaves broader, more oblong. Flowers rather larger; calyx-lobes shorter and broader.—G. Matthewsii *Petrie in Trans. N.Z. Inst.* xliv (1912) 183.

Var. **novae-zealandiae.**—Smaller and more slender, 1–5 in. high. Leaves ¼–½ in. long, oblong- or ovate-spathulate. Flowers smaller. G. novae-zealandiae *Armstr. in Trans. N.Z. Inst.* iv (1872) 290. T. 71 (1944) 90.

North Island: Base of Tongariro, *Bidwill;* Waimarino Plains, *E. Phillips Turner! T. F. C., Cockayne,* and others; Ohakune, *Spencer!* Ruapehu, *H. Hill! Cockayne!* Mount Egmont, *T. F. C., Petrie!* Ruahine Mountains, *Colenso! Tryon! B. C. Aston!* and others; Tararua Mountains, *Buchanan!* South Island, Stewart Island: In various localities, but often local. Sea-level to 4000 ft. December–February.

This was reduced to Forster's *G. montana* by Sir J. D. Hooker; but Mr. N. E. Brown, who has done me the service of examining Forster's types preserved in the British Museum and at Kew, informs me that it is quite distinct, and in no way resembles *G. montana.* It may be recognized by the usually much-branched slender and wiry sparingly leafy stems, small rather thin leaves, small flowers terminal and solitary on the branches, and linear-subulate calyx-lobes.

5. **G. chathamica** *Cheesem. Man. N.Z. Fl.* (1906) 449.—Annual, 6–12 in. high; main stem stout or slender, erect, with or without several shorter and weaker branches springing from the base and usually decumbent below. Radical leaves variable in size, ½–1¼ in. long, narrowed into short petioles or almost sessile, ovate-spathulate or oblong-spathulate to broadly oblong, obtuse, rather thin; cauline 1 or 2 pairs, ovate or oblong, sessile with a broad often almost cordate base. Flowers small, ⅓–½ in. long, white, sometimes veined with pink, arranged in several 3–12-flowered umbels terminating the stem and its branches, each umbel with an involucre of 3–5 whorled bracts; pedicels usually longer than the bracts. Calyx about ¾ the length of the corolla, divided about ¾-way down; lobes linear-

oblong, obtuse. Corolla narrow-campanulate, divided $\frac{2}{3}$-way down; lobes oblong or oblong-obovate, rounded at the tip. Ovary linear-oblong, sessile. —*Ill. N.Z. Fl.* ii (1914) t. 138. G. pleurogynoides *var.* umbellata *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 335.

CHATHAM ISLANDS: Abundant in wet places, *H. H. Travers! Miss Seddon! F. A. D. Cox* and *Cockayne!*

I consider this to be a very distinct species, to be recognized without any difficulty by the peculiar habit, small and broad thin leaves, and small umbellate flowers, with a deeply divided calyx and corolla. A specimen collected by Mr. Buchanan at the Lindis Pass, Otago, and another gathered by Professor H. B. Kirk on D'Urville Island may belong to the same species, but they are far more copiously branched and have much longer leaves, and are best held over until more complete material is obtained.

6. **G. tenuifolia** *Petrie in Trans. N.Z. Inst.* xlv (1913) 270.—Apparently annual; stems smooth, slender, terete, simple or more generally branched at the base, 9–18 in. high, generally marked on each side with a narrow ridge decurrent from the base of the leaves. Radical leaves many at the base of the stem, often rosulate, variable in size, 1–4½ in. long, obovate-oblong to obovate-spathulate, gradually narrowed at the base into a short petiole, rounded at the tip, or rarely subacute, thin and membranous, entire, quite glabrous; veins reticulated. Cauline leaves in 2–5 remote pairs. Flowers rather small, $\frac{1}{3}$–$\frac{1}{2}$ in. long, white, arranged in many-flowered involucrate umbels terminating the stems or main branches. Pedicels about $\frac{1}{4}$ in. long. Calyx cut down to about $\frac{3}{4}$-way to the base; lobes linear-subulate, acute. Corolla rather longer than the calyx; lobes divided about $\frac{2}{3}$-way down.

SOUTH ISLAND: Nelson—Boundary Creek and Lyell River, Buller Valley, *W. Townson!* Gordon's Nob, *Petrie! T. F. C.;* Hanmer Plains, *C. E. Christensen! Petrie!* Marlborough—Mount Blairich, *H. J. Matthews!* Canterbury—Waimakariri Gorge, *Cockayne!* Lake Pearson, *A. Wall!* Otago—Near Queenstown, *Petrie!* Lake Hauroko, *Crosby Smith.* 1000–4000 ft. January–March.

This appears to be a distinct species, easily recognized by the tall slender habit, large membranous leaves, and involucrate umbels of small white flowers.

7. **G. tereticaulis** *Petrie in Trans. N.Z. Inst.* xlix (1917) 51.—Annual; stem slender, simple, erect, smooth and terete, 8–14 in. high. Radical leaves few or rarely many, variable in size, $\frac{3}{4}$–2 in. long, ovate or oblong-ovate, gradually narrowed at the base into a flattened petiole equalling or exceeding the blade, quite glabrous, thin and membranous, entire, acute or subacute; veins reticulated; margins flat. Cauline leaves in 2–3 distant pairs, $\frac{1}{2}$–1 in. long, the uppermost sessile, the lowermost shortly petiolate, usually acute. Flowers arranged in a terminal 4–8-flowered umbel, sometimes furnished with a few smaller umbels or solitary flowers springing from the upper cauline leaves. Peduncles twice as long as the flowers, smooth, slender, erect. Flowers about $\frac{3}{4}$ in. long, white; calyx about $\frac{1}{2}$ as long as the corolla, cut down for about $\frac{2}{3}$ its length into 4 subulate-lanceolate lobes. Corolla divided for about $\frac{3}{4}$ of its length into 4 rounded lobes. Stamens exceeding the calyx. Mature pistil exserted beyond the corolla.

SOUTH ISLAND: Otago—Grassy slopes near Lake Harris, Routeburn Valley, *Petrie!*

I have seen no specimens except those gathered by Mr. Petrie. He states that it is intermediate between *G. tenuifolia* and *G. corymbifera.*

8. **G. montana** *Forst. f. Prodr.* (1786) n. 133.—Perennial; rootstock stout and woody, often branched at the top. Flowering stems one or several, simple, terete, very tall and stout, 10–24 in. high. Radical leaves usually very numerous, densely crowded, spreading, $\frac{3}{4}$–$1\frac{1}{2}$ in. long, $\frac{1}{3}$–$\frac{3}{4}$ in. broad, broadly obovate-spathulate, rounded at the tip or subacute, gradually narrowed into a broad flat petiole, 3–5-nerved, coriaceous, rather thick and fleshy when fresh. Cauline leaves in 2–6 opposite pairs, sessile, broadly ovate or oblong, 3–5-nerved or in large specimens 7-nerved, acute or subacute, often cordate at the base. Flowers very large, white, often $\frac{3}{4}$–1 in. diam., in broad many-flowered umbels or cymes 2–4 in. across; pedicels long, slender; bracts broad, usually whorled. Calyx from $\frac{1}{2}$ to nearly $\frac{2}{3}$ the length of the corolla, cut $\frac{3}{4}$-way down; lobes lanceolate, acute. Corolla deeply divided; lobes broadly oblong or obovate, rounded at the tip.—*A. Rich. Fl. Nouv. Zel.* (1832) 203; *A. Cunn. Precur.* (1838) n. 399 (*but not of Hook. f. Fl. Nov. Zel.* i (1853) 178, *nor of Handb. N.Z. Fl.* (1864) 190); *Cheesem. Man. N.Z. Fl.* (1906) 451.

Var. **stolonifera**.—Much more slender, 8–16 in. high; stem with long creeping stolons at the base. Radical leaves 1–3 in. long, oblong- or elliptical-spathulate, rather thin; petiole more slender, as long as the blade. Flowers fewer, $\frac{1}{2}$–$\frac{3}{4}$ in. diam., white with purple streaks.

South Island: Nelson—Mount Arthur, Mount Peel, and other peaks to the northwards, *F. G. Gibbs!* Mount Stormy, Mount Frederic, Mount Rochfort, Mount Buckland, and other peaks on the coast ranges near Westport, abundant, *W. Townson!* Paparoa Ranges, *P. G. Morgan!* mountains above the Cannibal Gorge, *F. G. Gibbs!* Otago—Dusky Sound, *Forster*, *Anderson*, *Lyall*. 2000–4000 ft. January–March.

At the time of the publication of the Flora and Handbook there was no authentic specimen of *G. montana* at Kew, and Forster's original diagnosis is so short and scanty that the position of the species was quite conjectural. Hooker applied the name to the slender annual plant with linear-subulate calyx-lobes originally described by him in the "Icones Plantarum" as *G. Grisebachii*, and for many years this determination was acquiesced in by New Zealand botanists. But a set of Forster's plants now exists at Kew, and another in the British Museum Herbarium. Mr. N. E. Brown, who has critically examined for me the New Zealand Gentians preserved in both collections, informs me that Forster's types of *G. Montana* represent an altogether different plant to *G. Grisebachii*, but that they agree with specimens collected in Dusky Sound by Anderson during Cook's third voyage, and subsequently in the same locality by Lyall. I am indebted to Mr. Brown for tracings of Forster's two specimens, which appear to be the only ones extant in England, and also of three of Lyall's. Forster's are far from good; but Lyall's correspond so closely with a plant collected on the coast ranges near Westport by Townson that I can hardly doubt their being identical, although the Westport specimens are rather larger and stouter. Both agree in the numerous crowded obovate-spathulate radical leaves, and the short and broad cauline leaves, which are sessile and cordate at the base, and the inflorescence is practically the same. And both agree fairly well with the description given in A. Richard's "Flore de la Nouvelle-Zélande," which is professedly taken from Forster's manuscripts. Probably the species will be found in suitable localities along the whole of the western coast, from the Karamea River and Westport to Dusky Sound.

9. **G. gracilifolia** *Cheesem. Man. N.Z. Fl.* (1906) 1144.—Perennial, dark-green, much branched at the base, forming compact sward-like patches 2–6 in. diam. or more. Flowering stems numerous, 3–6 in. high, decumbent at the base, erect above. Leaves numerous, crowded at the base of the stem or on short erect branches, $\frac{1}{3}$–$\frac{2}{3}$ in. long, $\frac{1}{10}$–$\frac{1}{8}$ in. broad, narrow linear-spathulate or linear-lanceolate, acute, sessile or the lower ones narrowed into short petioles, rather thick and coriaceous, dark-green and shining when fresh, often blackish-brown when dry. Cauline leaves 2–4 distant opposite pairs, similar to the radical. Flowers 2–4 to each stem, $\frac{1}{3}$–$\frac{1}{2}$ in.

diam., pure-white. Calyx divided from $\frac{2}{3}$ to $\frac{3}{4}$ of the way down; lobes lanceolate or linear-lanceolate, acute or acuminate. Corolla campanulate, divided $\frac{2}{3}$ of the way down; lobes oblong-obovate, obtuse or subacute. Stamens about $\frac{1}{2}$ as long as the corolla. Ovary linear-oblong.—*Ill. N.Z. Fl.* ii (1914) t. 137.

South Island: Nelson—Peaty localities by the margin of small tarns on the Mount Arthur Plateau, alt. 3500–4500 ft., *T. F. C., F. G. Gibbs!* February–March.

This appears to be a perfectly distinct species, perhaps more nearly allied to *G. Townsoni* than to any other, but easily distinguished by the much smaller size, by often forming a compact sward, by the smaller narrower and much more numerous leaves, and by the smaller and fewer flowers. So far, it has not been seen except on the Mount Arthur Plateau, but it probably extends northwards to the high mountainous country at the back of Collingwood. T. 71:90.

10. **G. Townsoni** *Cheesem. Man. N.Z. Fl.* (1906) 450.—Perennial; root slender, woody, often branched at the top. Flowering stems usually single, rarely 2 or 3 from the root or branched from the base, erect, slender, wiry, 6–20 in. high. Leaves almost black when dry; radical very numerous, crowded at the base of the stem, spreading or ascending, small for the size of the plant, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, $\frac{1}{6}$–$\frac{1}{3}$ in. broad, ovate-lanceolate or trowel-shaped to linear-lanceolate, narrowed into a rather slender petiole, coriaceous or almost fleshy, subacute or obtuse. Cauline leaves in 2–5 remote pairs, ascending, lanceolate or oblong-lanceolate, sessile, subacute. Flowers white, large, $\frac{3}{4}$ in. diam. or more, in 5–12-flowered terminal cymes or umbels; pedicels slender; bracts usually whorled. Calyx about $\frac{1}{2}$ the length of the corolla, cut about $\frac{3}{4}$-way down; lobes lanceolate, acute. Corolla deeply divided; lobes broadly oblong, rounded at the tip.—*Ill. N.Z. Fl.* ii (1914) t. 139. G. saxosa var. pleurogynoides *Hook. f. Fl. Nov. Zel.* i (1853) 178 (*in part*). G. pleurogynoides *Hook. f. Handb. N.Z. Fl.* (1864) 190 (*in part*) (*not of Griseb.*).

South Island: Nelson—*Bidwill* (n. 67 in Herb. Kew, *fide* N. E. Brown); abundant on the coast ranges near Westport, Mount Frederic, Mount Rockfort, Mount Buckland, &c., and certainly extending from the Karamea River to Greymouth, and possibly farther south, *T. Townson! Petrie! P. G. Morgan*, and others; sounds of the south-west coast of Otago, *Lyall* (*fide* N. E. Brown). 1000–4000 ft. January–March.

A very beautiful plant, easily recognized by the tall slender strict stems, small uniform crowded leaves, which are almost black when dry, remote ascending cauline leaves, and rather dense umbels of large flowers.

11. **G. corymbifera** *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 336.—Usually perennial, but often dying after flowering. Root stout, long and tapering. Stems simple or rarely branched from the base, stout, erect, terete, 6–20 in. high. Radical leaves numerous, rosulate, 2–4 in. long, $\frac{1}{4}$–$\frac{3}{4}$ in. broad, narrow oblong-spathulate or lanceolate-spathulate, obtuse or acute, narrowed into a short or long petiole, blade often channelled above, 1–3-nerved, coriaceous, rather thick and fleshy when fresh. Cauline leaves 1 or 2 pairs, seldom more, $\frac{3}{4}$–2 in. long, linear-lanceolate or linear-oblong, sessile. Flowers large, $\frac{1}{2}$–$\frac{3}{4}$ in. diam., white, in large compact terminal umbels or cymes 2–6 in. diam. or more; pedicels slender. Calyx short, often less than $\frac{1}{2}$ the length of the corolla, campanulate, divided from $\frac{1}{3}$ to $\frac{1}{2}$ way down, rarely more; lobes lanceolate-deltoid, acute or acuminate. Corolla divided about $\frac{2}{3}$-way down; lobes broadly oblong, rounded at

the tip. Ovary stipitate.—*Cheesem. Man. N.Z. Fl.* (1906) 449. G. saxosa *var.* γ *Handb. N.Z. Fl.* (1864) 191. G. pleurogynoides *var.* rigida *T. Kirk Trans. N.Z. Inst.* xxvii (1895) 335.

South Island: Mountain districts from Nelson to Otago, abundant. 1000–4000 ft. January–March.

A very handsome plant, in its ordinary state well distinguished by the stout usually simple and almost naked stems, long and narrow crowded rosulate radical leaves, and dense cymes or umbels of large white flowers, the calyx of which is broad and short, with lanceolate-deltoid acute lobes. Mr. Brown informs me that it corresponds with the *G. saxosa* var. γ of the Handbook, and I suspect that it also includes a part of the *G. pleurogynoides* of the same work. At any rate, it is the plant which New Zealand botanists have been accustomed to call *G. pleurogynoides*. The true *G. pleurogynoides* was founded on Tasmanian specimens, and has not yet been satisfactorily matched with any New Zealand plant.

12. **G. serotina** *Cockayne in Trans. N.Z. Inst.* xlvii (1915) 113.—Annual or biennial, 5–9 in. high. Stems simple or forked at the base, terete, strict, erect, furnished on each side with a ridge decurrent from the base of the

Gentiana serotina Ckn.

= (G. scrotina, Ckn.)

T.N.Z.I. vol. 57, p. 55. Ckn. & Allan.

Pelorus Valley, *J. H. Mackenzie!*

Common in open tussock country of the upper plains, Malvern Hills, &c., *Cockayne!* Otago—Locality not stated, *Buchanan!* Hawea Flat, *Petrie!* March–April.

This appears to be a reduced state of *G. corymbifera*, of which it has the remarkable calyx. It differs from *G. patula* in its much smaller size and more slender habit, smaller and narrower flowers, &c.

13. **G. patula** *Cheesem. Man. N.Z. Fl.* (1906) 449.—Usually perennial; root stout or slender. Stems one or several from the root, often decumbent at the base, erect above, simple or branched, 5–20 in. high. Radical leaves usually numerous, 1–3 in. long, oblong-spathulate or lanceolate-spathulate, rarely broader and ovate-spathulate, acute or obtuse, coriaceous or slightly membranous. Cauline leaves in 1–5 opposite pairs, oblong or linear-oblong or lanceolate, sessile. Flowers large, ¾–1 in. diam., white, in few- or many-flowered terminal umbels or corymbose cymes. Calyx divided nearly ¾-way down; lobes linear-oblong, acute or obtuse. Corolla deeply divided; lobes oblong or broadly oblong, rounded at the tip.—G. saxosa *var.* β *Hook. f. Handb. N.Z. Fl.* (1864) 191. G. bellidifolia *var.* patula *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 336.

North Island: Mount Holdsworth, Tararua Range, *W. Townson!* Mount Hector, *Petrie!* South Island: Abundant in mountain districts throughout. 1000–4000 ft. January–March.

A very variable plant. What may be regarded as the typical state has a stout fusiform root often shortly branched at the top, each branch bearing a crown of oblong-spathulate radical leaves and a flowering stem 6–18 in. high. Dwarf specimens are undistinguishable from *G. bellidifolia;* but usually the stems are much taller, giving the plant quite a different appearance, and the flowers are much more numerous. Other states approach *G. montana*, *G. corymbifera*, and *G. Townsoni*; and small copiously branched forms appear to pass into *G. divisa.*

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12. **G. serotina** *Cockayne in Trans. N.Z. Inst.* xlvii (1915) 113.—Annual or biennial, 5–9 in. high. Stems simple or forked at the base, terete, strict, erect, furnished on each side with a ridge decurrent from the base of the leaves, purplish-red. Radical leaves usually few, rosulate, ½–1½ in. long, narrow linear-spathulate, obtuse at the tip, gradually narrowed into a long petiolate base. Cauline leaves in 2–4 remote opposite pairs, sessile, connate at the base, ½–1 in. long; margins entire, purplish-brown. Flowers arranged in 3–5 terminal umbels, or rarely solitary, about ½ in. diam., white. Calyx cut ½- to ⅔-way down to the base into 4 subulate long acuminate lobes. Corolla ¾ in. long, 2½ times longer than the calyx, deeply cut into 4 obtuse lobes, which are shortly mucronate at the tip.

South Island: Probably not uncommon on the eastern side. Marlborough—Pelorus Valley, *J. H. Macmahon!* Nelson—Hanmer Plains, *T. F. C.* Canterbury—Common in open tussock country of the upper plains, Malvern Hills, &c., *Cockayne!* Otago—Locality not stated, *Buchanan!* Hawea Flat, *Petrie!* March–April.

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14. **G. vernicosa** *Cheesem. Man. N.Z. Fl.* (1906) 1145.—Perennial; root long, slender, bearing at the top a compact tuft of radical leaves, and 1–5 stout flowering stems 4–9 in. high, which are decumbent at the base but erect above. Radical leaves numerous, crowded, ½–1¼ in. long, ⅙–⅓ in. broad, narrow oblong-spathulate or linear-oblong, obtuse or subacute, narrowed to a broad sessile base, dark-green, polished and shining, somewhat concave above, thick and coriaceous, especially towards the tip, but becoming thinner at the base. Cauline leaves many towards the base of the flowering stems, in distant pairs above, similar to the radical but smaller and more acute. Flowers large, white, ½–¾ in. diam., in 2–7-flowered terminal umbels or corymbose cymes. Calyx ½ the length of the corolla; lobes lanceolate or oblong-lanceolate, acute. Corolla divided ¾-way down or more; lobes obovate-oblong, rounded at the tip. Ovary linear-oblong.

South Island: Nelson—Mount Lockett (to the north of Mount Arthur), alt. 3500–4500 ft., *F. G. Gibbs!* February–March.

I have only three good specimens of this plant, but they all agree in the thick and coriaceous polished and shining leaves, which present quite a different appearance from those of any other species known to me.

15. **G. bellidifolia** *Hook. f. in Hook. Ic. Plant.* (1844) t. 635.—Perennial; variable in size and habit, the typical form with a stout fusiform root crowned with numerous short densely compacted stems, the flowering ones few or many, 1–6 in. high. Radical leaves numerous, crowded, rosulate, ½–1½ in. long, spathulate or linear-spathulate, obtuse, narrowed into a short petiole, coriaceous or fleshy, nerves usually indistinct. Cauline leaves few, distant, linear-oblong to linear-obovate, obtuse, sessile, often recurved. Flowers large, white, ⅔–¾ in. diam. or even more, terminal, solitary or in 2–6-flowered cymes. Calyx ½ the length of the corolla or shorter; lobes linear-oblong to elliptic-ovate, subacute. Corolla divided ¾-way down; lobes obovate-oblong, rounded at the tip. Ovary shortly stipitate.—*T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 336; *Cheesem. Man. N.Z. Fl.* (1906) 45; *Ill. N.Z. Fl.* ii (1914) 140. G. saxosa *Hook. f. Handb. N.Z. Fl.* (1864) 191 (*not of Forst. f.*).

Var. **australis** *Petrie n. var.*—Stouter, often forming short dense patches 3–5 in. diam. Flowers abundantly produced, large, often quite 1 in. diam.

North and South Islands: Not uncommon in mountain districts from the East Cape, Taupo, and Mount Egmont to Foveaux Strait. 1500–5500 ft. January–March. Var. *australis* appears to be not uncommon on high peaks on the mountains of the western coast of the South Island, from Karamea to Westport, Westland, and south-west Otago.

A very variable and very beautiful little plant. The plate in the "Icones Plantarum," which must be taken as the type, represents a somewhat small state, with solitary flowers, but it is otherwise an excellent representation of the species. Mr. Petrie sends me a very curious state, collected on Mount Tennyson, in which the upper part of the stem and calyx are coloured dark blackish-purple, but I do not see any other differences of importance.

16. **G. flaccida** *Petrie in Trans. N.Z. Inst.* xliii (1911) 255.—Apparently perennial; root stout for the size of the plant, stems single or several from the base of the plant, slender, flaccid, undivided, erect, 2–6 in. high, furnished on each side with a ridge decurrent from the base of the leaves, otherwise smooth and terete. Radical leaves very numerous, ½–1 in. long, thin and membranous, flaccid, quite glabrous; blade oblong or

G. spedeni Petrie Trans 56 : 1926 : 14 . Princess Pk.
G. amabilis .. .. Mt Tennyson Castle Mts.

ovate to oblong-spathulate, gradually narrowed into a petiole of equal length or longer. Cauline leaves in 1–3 remote opposite pairs, $\frac{1}{4}$–$\frac{1}{2}$ in. long, petioles short or almost wanting. Flowers solitary, terminal, large for the size of the plant, $\frac{1}{2}$–$\frac{3}{4}$ in. diam., white. Calyx divided about $\frac{3}{4}$-way down into 4 oblong-lanceolate acute lobes, with an evident midrib. Corolla deeply divided, twice as long as the calyx; lobes obtuse. Stamens rather longer than the calyx.

South Island: Canterbury—Sealy Range, Mount Cook district, *Petrie!* Otago —End Peak, Lake Hauroko, *Crosby Smith!* 2500–4500 ft. January–March.

Mr. Petrie considers this to be nearest to *G. lineata*, from which it appears to me to be widely different. I should place it in the vicinity of *G. bellidifolia*. = bellidifolia ?

(kirk)

17. **G. divisa** *Cheesem. Man. N.Z. Fl.* (1906) 453.—Stems slender, erect, excessively branched from the base, often forming hemispherical masses 2–9 in. diam. Radical leaves very numerous, rosulate, 1–3 in. long, oblong- or obovate-spathulate, rounded at the tip, gradually narrowed into broad flat petioles, usually rather thin and membranous, 3–5-nerved. Cauline leaves similar but smaller and on shorter petioles or the uppermost sessile. Flowers very numerous, in dense or lax corymbose cymes, sometimes almost concealing the leaves, about $\frac{3}{4}$ in. diam., white. Calyx rather more than $\frac{1}{2}$ the length of the corolla, divided $\frac{3}{4}$-way down or more; lobes linear-oblong, obtuse or subacute. Corolla deeply divided; lobes oblong, rounded at the tip.—G. bellidifolia *vars.* divisa, vaccilata, and magnifica *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 337.

South Island: In various localities in the central chain of the Southern Alps, from the Spenser Mountains southwards, but not common. 1000–3500 ft.

This has a remarkably distinct habit, often forming compact globose masses 3–9 in. diam., so densely covered with flowers as to resemble large snowballs. Mr. Kirk made three varieties of it; but the differences are so slight that they are best treated as forms of one variable plant. T. 71, 90 & 72: 326.

18. **G. Astoni** *Petrie in Trans. N.Z. Inst.* xlviii (1916) 187.—Perennial; root usually slender. Stems numerous, perfectly glabrous, very variable in habit of growth, erect or spreading or even entangled or trailing, much or sparingly branched, long or short, 6–12 or 18 in. long. Leaves in opposite pairs, almost connate at the base, $\frac{1}{2}$–$\frac{2}{3}$ in. long, linear or narrow linear-spathulate, acute or subacute, somewhat flaccid, midrib obscure; margins more or less recurved. Flowers freely produced, terminating the main branches or axillary in the upper leaves, white, $\frac{1}{2}$–$\frac{3}{4}$ in. long; peduncles slender, erect, rather shorter than the leaves. Calyx obconic, cut almost to the base into 5 linear-subulate lobes. Corolla much longer than the calyx, deeply divided into 5 oblong-lanceolate acute lobes. Stamens and pistil about $\frac{1}{2}$ the length of the corolla.

South Island: Marlborough—Limestone ridges near the source of the Ure River, Kaikoura Mountains, *B. C. Aston!*

A very remarkable species, quite unlike any other known in New Zealand.

19. **G. Spenceri** *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 335.—Annual; stems few or many from the root, slender, erect, 4–10 in. high. Radical leaves numerous, rosulate 1–2 in. long, broadly ovate- or obovate-spathulate, rounded at the tip, narrowed into a broad petiole as long or longer than the blade, 3- or rarely 5-nerved; cauline few, rather narrower

and with shorter petioles. Flowers $\frac{1}{3}$–$\frac{1}{2}$ in. long, white or white streaked with purple veins, in dense 5–12-flowered umbels, each stem usually with a terminal umbel and 2 lateral ones springing from a pair of leaves half-way down; umbels surrounded by a whorl of 5–7 oblong-spathulate leaves overtopping the flowers and forming a kind of involucre; pedicels short. Calyx cut down almost to the base; lobes linear, acute. Corolla hardly longer than the calyx, divided about $\frac{2}{3}$-way down; lobes linear-oblong, obtuse.—*Cheesem. Man. N.Z. Fl.* (1906) 453; *Ill. N.Z. Fl.* ii (1914) t. 141.

South Island: Nelson—Cobb Valley (near Mount Peel), *F. G. Gibbs!* coastal mountains from the Karamea River through Mount Frederic, Mount Rochfort, Mount Buckland, &c., to the Paparoa Mountains, not uncommon, *W. Townson! Spencer! Petrie! P. G. Morgan!* South-west Otago—Mackinnon's Pass, *F. G. Gibbs!* 1500–3500 ft. January–March.

G. Spenceri is a well-marked and perfectly distinct plant, not at all closely allied to the other New Zealand species. It can always be distinguished by the erect slender habit, numerous rosulate obovate-spathulate radical leaves, few cauline leaves, and particularly by the involucrate umbels and small flowers, the corolla of which is not much longer than the calyx. The flowers are sometimes white, but more often, according to Mr. Townson, white streaked with numerous purple veins.

20. **G. saxosa** *Forst. f. in Act. Holm.* (1777) 183, t. 5.—Perennial. Stems stout, usually much branched, prostrate or decumbent below, ascending or suberect at the tips, 3–6 in. long. Radical leaves numerous, crowded, spreading, $\frac{3}{4}$–$1\frac{3}{4}$ in. long, spathulate or linear-spathulate, obtuse, narrowed into slender petioles as long or longer than the blade, fleshy, nerveless; cauline similar but smaller and on shorter petioles, close together or distant. Flowers terminal, solitary or in 2–5-flowered cymes at the tips of the branches, large, white, $\frac{1}{2}$–$\frac{3}{4}$ in. long. Calyx small, broad, about $\frac{1}{3}$ as long as the corolla, divided nearly $\frac{3}{4}$-way down; lobes linear or linear-ligulate, obtuse or subacute, recurved at the tips. Corolla often nearly $\frac{3}{4}$ in. diam., broadly campanulate or subrotate, divided rather more than half-way down; lobes oblong, obtuse.—*Forst. f. Prodr.* (1786) 132; *A. Rich. Fl. Nouv. Zel.* (1832) 202; *A. Cunn. Precur.* (1838) n. 398; *Raoul Choix* (1846) 44; *Hook. f. Fl. Nov. Zel.* i (1853) 178; *Handb. N.Z. Fl.* (1864) 190 (*in part*); *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 348; *Cheesem. Man. N.Z. Fl.* (1906) 454. G. saxosa *var.* recurvata *T. Kirk in Trans. N.Z. Inst.* xvii (1885) 224. G. Hookeri *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 340 (*in part*) (*not of Grisebach*).

South Island: Nelson—Coast near Charleston, *W. Townson!* Westland—Near Hokitika, *Helms!* Otago—Dusky Sound, on rocks washed by the sea, *Forster, Menzies;* Bluff Hill, *F. W. Hutton! T. Kirk! Cockayne!* Colac Bay and Fortrose, *B. C. Aston!* Catlin's River, *Petrie!* islands in Foveaux Strait, *T. Kirk! Poppelwell.* Stewart Island: Various stations along the coast, *Petrie! T. Kirk! Cockayne,* and others. Sea-level to 800 ft. January–April.

Purely littoral, and confined to rocky shores or sandhills exposed to salt spray. Its distinguishing characters lie in the usually prostrate or decumbent habit, rather fleshy long-petioled leaves, short and broad deeply divided calyx, with the lobes recurved at the tips. In the Handbook it is merged with *G. bellidifolia* and other mountain species, with which it does not seem to have any very close affinity, its nearest ally, as Mr. Kirk has pointed out, being undoubtedly *G. cerina.*

21. **G. cerina** *Hook. f. Fl. Antarct.* i (1844) 54, t. 36.—Perennial. Stems usually numerous, much branched, stout, prostrate or decumbent at the base, ascending or suberect at the tips, leafy throughout or naked

below, 4–14 in. long. Leaves ½–1½ in. long, obovate-spathulate or oblong-spathulate, obtuse, narrowed into a broad flat petiole, thick and coriaceous or fleshy, smooth and shining, 3-nerved; cauline similar but smaller and with shorter petioles. Flowers on slender pedicels or almost sessile, crowded towards the ends of the branches, sometimes corymbose, ⅓–⅔ in. long, white or white streaked with red and purple. Calyx about ⅓ shorter than the corolla or almost equalling it, divided ¾-way down; lobes oblong or oblong-spathulate, obtuse, sometimes slightly recurved at the tip. Corolla broadly rotate-campanulate; lobes oblong, obtuse.—*Handb. N.Z. Fl.* (1864) 191; *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 338; *Cheesem. Man. N.Z. Fl.* (1906) 454. G. Campbelli *Homb. et Jacq. Voy. au Pôle Sud* (1852) 22, t. 31c.

Var. **suberecta** *T. Kirk l.c.* 339.—Stems more slender, suberect, decumbent at the base, 6–18 in. high. Cauline leaves more remote. Flowers in rather lax corymbs, usually on long pedicels. Calyx-lobes broadly oblong.

Auckland Islands: Not uncommon from sea-level to nearly 1000 ft., *Hooker! T. Kirk! Chapman!*

A remarkably brilliant plant, well figured in the "Flora Antarctica." Both varieties are apparently abundant.

22. **G. concinna** *Hook. f. Fl. Antarct.* i (1844) 53, t. 35.—Usually annual. Stems short, slender, much branched from the base, erect or ascending, 1–4 in. high; branches crowded, leafy. Leaves close-set, ⅓–1 in. long, oblong-spathulate or linear-oblong, obtuse, gradually narrowed into a broad flat petiole, spreading or recurved, coriaceous; cauline similar but smaller. Flowers in the axils of the upper leaves, often very numerous, sessile or shortly peduncled, about ⅓ in. long, white streaked with red or purple or altogether red. Calyx ⅓ shorter than the corolla, divided ¾-way down; lobes linear-oblong, obtuse. Corolla rotate-campanulate; lobes obovate-oblong, obtuse.—*Handb. N.Z. Fl.* (1864) 190; *Cheesem. Man. N.Z. Fl.* (1906) 455. G. cerina *var.* concinna *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 339.

Auckland Islands: Not uncommon, *Hooker, T. Kirk! Chapman!*

A charming little plant, very closely allied to *G. cerina*, from which it is mainly separated by being annual, by the more erect mode of growth, and by the smaller size of all its parts. According to Mr. Kirk, it is usually found growing on the surface of the huge masses of *Trichocolea tomentella* and other *Hepaticae* which often carpet the ground in sheltered places in the Auckland Islands.

23. **G. antarctica** *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 339.—Annual; whole plant very minutely verrucose. Stems stout, erect, simple or branched, densely leafy throughout, 3–10 in. high. Radical leaves numerous, spreading all round, 1–2 in. long; blade oblong or lanceolate, obtuse, 3–5-nerved, membranous when dry, narrowed into a petiole of about equal length; cauline leaves rather smaller, with shorter petioles. Flowers small, about ⅓ in. long, crowded on short axillary leafy branchlets shorter than the subtending leaves, each flower in the axil of a floral leaf exceeding it in length; pedicels short, slender. Calyx equalling the corolla or nearly so, divided almost to the base; lobes linear or ligulate, obtuse. Corolla divided about ⅔-way down; lobes linear-oblong, obtuse or subacute. Ovary minutely verrucose.—*Cheesem. Man. N.Z. Fl.* (1906) 455. G. concinna *var.* robusta *Hook. f. Fl. Antarct.* i (1844) 53.

Var. **imbricata** *T. Kirk l.c.* 340. — Rigid, erect, 1–3 in. high. Leaves smaller, closely imbricating, ovate or ovate-spathulate, not verrucose, coriaceous, margins thickened. Flowers solitary in the axils of the upper leaves; corolla longer than the calyx.

Campbell Island: *Hooker, T. Kirk!*

Apparently a very distinct species. Mr. Kirk remarks that it is easily recognized by the pale-greenish colour, the minutely verrucose surface of all its parts, and the slender excessively branched inflorescence, the flowers being almost hidden amongst the crowded leaves and bracts. It is sometimes reduced to a broad rosette of leaves with a short spike-like cluster of densely crowded flowers.

24. **G. antipoda** *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 340. — Perennial; whole plant very minutely verrucose. Stems numerous, stout, decumbent below, erect above, 3–10 in. high. Leaves $\frac{3}{4}$–$1\frac{1}{2}$ in. long, linear-spathulate or lingulate, obtuse, narrowed into a rather long flat petiole; lower crowded, often spreading or recurved; upper more remote, smaller and with shorter petioles, ascending or erect. Flowers small, $\frac{1}{4}$–$\frac{1}{3}$ in. long, white or white streaked with red, usually numerous on slender erect axillary branchlets, each flower in the axil of a linear bract, but sometimes the flowers are solitary in the axils of the cauline leaves. Calyx slightly shorter than the corolla, divided almost to the base; lobes linear-lanceolate, acute. Corolla very thin, divided about $\frac{2}{3}$-way down; lobes linear-oblong.—*Cheesem. Man. N.Z. Fl.* (1906) 456.

Antipodes Island: Abundant, *T. Kirk.*

Perhaps too close to the preceding, from which it mainly differs in the more numerous stems and narrower lingulate leaves. Mr. Kirk distinguished two forms, one with yellowish stems and white flowers, the other with reddish stems and flowers streaked with red.

It should be remarked that both this species and *G. antarctica* occasionally produce much smaller flowers which have smaller almost sessile anthers and ovaries with fewer ovules. Probably these flowers are cleistogamic, but my specimens are not sufficiently good to determine this.

3. **LIPAROPHYLLUM** Hook. f. 1847

A small creeping herb. Leaves linear, tufted, entire. Peduncles solitary, terminal, 1-flowered. Flowers small, white. Calyx deeply 5-partite; segments linear. Corolla subrotate, deeply 5-lobed; lobes with broad thin margins, induplicate-valvate. Stamens 5; filaments short, broad; anthers oblong. Ovary 1-celled, with 2 parietal placentas; style very short; stigma broadly 2-lamellate. Fruit globose, fleshy or succulent, indehiscent. Seeds numerous; testa crustaceous.

A monotypic genus, confined to New Zealand and Tasmania.

1. **L. Gunnii** *Hook. f. in Hook. Lond. Journ. Bot.* vi (1847) 472. — Small, perfectly glabrous. Rhizome 3–9 in. long, stout, creeping, branched, emitting long thick rootlets. Leaves tufted, $\frac{1}{2}$–1 in. long, narrow-linear or linear-spathulate, obtuse, thick and fleshy, with a broad membranous sheathing base, quite entire. Peduncles stout, much shorter than the leaves. Flowers small, $\frac{1}{6}$ in. diam. Calyx almost equalling the corolla; segments linear, fleshy, acute. Corolla divided $\frac{2}{3}$-way down; lobes ovate, 3-nerved, margins undulate. Stamens inserted just below the sinus of the lobes. Ovary broadly ovoid or almost globose; ovules numerous. Fruit globose,

about $\frac{1}{4}$ in. diam. Seeds orbicular, somewhat compressed.—*Fl. Tasm.* i (1860) 273, t. 87; *Benth. Fl. Austral.* iv (1869) 387; *Petrie in Trans. N.Z. Inst.* xii (1880) 35; *Cheesem. Man. N.Z. Fl.* (1906) 457.

North Island: Bogs between Ngauruhoe and Ruapehu, *T. F. C.*; central volcanic plateau, *Cockayne!* Kaimanawa Mountains, *B. C. Aston!* Tararua Mountains, Mount Hector, *Petrie;* Mount Denman and The Quoin, *B. C. Aston!* South Island: Mount Rochfort and other mountains near Westport, *Dr. Gaze! W. Townson!* Otago—Longwood Range, *T. Kirk!* Stewart Island: Not uncommon in bogs, *Petrie! T. Kirk! Thomson! Cockayne.* Ascends to nearly 5000 ft. on the Kaimanawa Mountains; descends to sea-level in Stewart Island. January–February.

A curious little plant, probably not uncommon in mountain-bogs on the west side of the South Island.

Family LXXXVII. **APOCYNACEAE.**

Erect or climbing shrubs, rarely trees or herbs, juice often milky. Leaves opposite or whorled, very rarely alternate, simple and entire; stipules wanting. Flowers regular, hermaphrodite, usually in axillary or terminal cymes. Calyx inferior, 4-lobed or -partite; lobes imbricate, often glandular at the base. Corolla gamopetalous, hypogynous, funnel- or salver-shaped; tube often hairy or scaly within; lobes 5, rarely 4, spreading, usually contorted in the bud. Stamens 5, rarely 4, inserted on the tube of the corolla; filaments short; anthers often sagittate, either free or connate and adhering to the stigma; pollen granular. Ovary superior, usually composed of 2 carpels connate only by their styles, but in one tribe the carpels are wholly combined into a 2-celled ovary with axile placentas or into a 1-celled ovary with 2 parietal placentas; ovules 2 or several or many; style single or separated at the base only, thickened above; stigma entire or 2-fid, often constricted in the middle. Fruit generally of 2 follicles opening along the inner edge, sometimes a drupe or berry. Seeds various, often with a tuft of silky hairs; albumen generally present; embryo straight, radicle usually superior.

A large family, abundantly represented in the tropics of both hemispheres, less plentiful in extra-tropical warm regions, and decidedly rare in the temperate zones. Genera about 100; species under 1000. The family includes many poisonous plants, some (as the ordeal-tree of Madagascar, *Tanghinia venenifera*) being exceedingly virulent. Others are employed medicinally as drastic purgatives or febrifuges. A few species yield indiarubber, but on the whole the family is not of much economic importance. The flowers are often of considerable beauty, and many genera are cultivated in gardens or greenhouses. The single New Zealand genus extends through Australia to India and Ceylon.

PARSONSIA R. Br.

Twining shrubs, with long slender branched stems, often woody below. Leaves opposite. Flowers small, in terminal or axillary corymbose cymes. Calyx 5-partite, naked or glandular within or furnished with 5 scales. Corolla salver-shaped; tube short, cylindrical or nearly globular, throat naked; lobes 5, spreading, the edges overlapping to the right. Stamens inserted about the middle of the corolla-tube or below it; filaments often twisted; anthers included or exserted, cohering in a cone or ring round the stigma, cells produced into 2 rigid empty basal lobes. Hypogynous scales 5. Ovary 2-celled; style slender; ovules numerous in each cell,

Fruit elongated, cylindric, of 2 coherent follicles which ultimately more or less separate from one another. Seeds linear or oblong, numerous, with a tuft of long silky hairs at the tip.

A small genus of about 12 species, found in tropical Asia, the Malay Archipelago, Australia, and New Zealand. Both the New Zealand species are endemic.

Flowers $\frac{1}{4}$ in. long. Calyx $\frac{1}{3}$ as long as the corolla-tube. Anthers included .. .. 1. *P. heterophylla.*

Flowers $\frac{1}{8}$ in. long. Calyx about as long as the corolla-tube. Anthers exserted .. .. 2. *P. capsularis.*

1. **P. heterophylla** *A. Cunn. Precur.* (1838) n. 402.—A tall and slender branching climber, often ascending trees to a considerable height; stems tough and pliant, in old specimens woody towards the base; young branchlets terete, more or less pubescent. Leaves extraordinarily variable in size and shape; of young plants 1–5 in. long, narrow-linear, linear- or oblong-spathulate, or linear-oblong, entire or irregularly sinuate or provided with 2–4 rounded lobes on each side, sometimes linear and expanding at the tip into an oblong or rounded blade; of mature plants $1\frac{1}{2}$–$3\frac{1}{2}$ in. long, usually from ovate or oblong-ovate to ovate-lanceolate or elliptic-lanceolate, sometimes obovate, more rarely narrower and lanceolate or linear, acute, petiolate, coriaceous, deep shining-green above, paler beneath, veins transverse. Cymes large, many-flowered, $1\frac{1}{2}$–4 in. long, terminal and axillary. Flowers white, sweet-scented, $\frac{1}{4}$ in. long. Calyx-lobes about $\frac{1}{3}$ as long as the corolla-tube. Corolla with a long tube often inflated below the throat; lobes much shorter than the tube. Anthers included within the corolla-tube. Capsule 3–6 in. long, terete, acute.—*Hook. f. Fl. Nov. Zel.* i (1853) 181; *Cheesem. Man. N.Z. Fl.* (1906) 440; *Ill. N.Z. Fl.* ii (1914) t. 135. P. albiflora *Raoul Choix* (1846) 17; *Hook. f. Handb. N.Z. Fl.* (1864) 187. P. variabilis *Lindl. in Journ. Hort. Soc.* v (1850) 196. P. macrocarpa *Col. in Trans. N.Z. Inst.* xiv (1882) 331.

North and South Islands, Stewart Island: Abundant from the Three Kings Islands and the North Cape to Foveaux Strait, less common in Stewart Island. Sea-level to 3000 ft. *Kaiku; Kaiwhiria.* November–March.

I have restored Cunningham's name for this species, it having at least five years' priority over that of Raoul. For some remarks on the extraordinary heterophylly of the species, see the plate and remarks thereon given in my Illustrations.

2. **P. capsularis** *R. Br. in Mem. Wern. Soc.* i (1809) 65.—Habit of *P. heterophylla*, but smaller and more slender. Leaves equally variable, of young plants $\frac{3}{4}$–3 in. long, narrow-linear or lanceolate to spathulate, entire or sinuate or irregularly lobed; of adult plants varying from extremely narrow-linear, 1–4 in. long by sometimes barely $\frac{1}{10}$ in. broad, to oblong or oblong-lanceolate, 1–$2\frac{1}{2}$ in. long by $\frac{1}{2}$–$\frac{3}{4}$ in. broad, obtuse or subacute, coriaceous; margins usually entire. Cymes few or many-flowered, axillary and terminal, usually shorter than the leaves. Flowers small, $\frac{1}{8}$ in. long. Calyx-lobes equalling the corolla-tube or very little shorter. Corolla campanulate, tube short; lobes revolute, as long as the tube. Anthers exserted.—*A. DC in DC. Prodr.* viii (1844) 401 (*in part*); *Raoul Choix* (1846) 17; *Hook. f. Fl. Nov. Zel.* i (1853) 180. P. rosea *Raoul l.c.* 16; *Hook. f. l.c.; Handb. N.Z. Fl.* (1864) 188. P. Forsteri *G. Don Gen. Syst.* iv (1838) 79. P. ochraceae *Col. in Trans. N.Z. Inst.* xxii (1890) 480. Periploca capsularis *Forst. f. Prodr.* (1786) n. 126; *A. Rich. Fl. Nouv. Zel.* (1832) 205.

Var. **parviflora** *H. Carse in Trans. N.Z. Inst.* xlix (1917) 46.—Leaves of mature plants narrow-linear, 2–4 in. long, about $\frac{1}{8}$ in. wide. Flowers small, $\frac{1}{8}$ in. long, creamy-white. This is probably the same as Forster's plant, but until a comparison can be made with his types the matter must remain in abeyance.

Var. **rosea** *Cockayne in Report Scenery Preserv.* (1915) 3. P. rosea *Raoul l.c.*—Leaves very similar to the preceding, but flowers rose-coloured.

Var. **grandiflora** *H. Carse l.c.*—More robust than the preceding, and leaves often broader. Flowers larger, $\frac{1}{6}$–$\frac{1}{5}$ in. long, red to yellowish-red or orange-red.

North and South Islands: From the North Cape to Foveaux Strait. Var. *parviflora* not uncommon, but often local. Var. *rosea* in several stations near Banks Peninsula. Var. *grandiflora*: Mongonui County, *H. Carse!* vicinity of Whangarei, *H. Carse! A. T. Pycroft!* Great Barrier Island, *Colonel Boscawen!*

Family LXXXVIII. **CONVOLVULACEAE.**

Herbs or shrubs, frequently twining, often with milky juice. Leaves alternate, exstipulate, wanting in *Cuscuta*. Flowers regular, usually hermaphrodite, axillary, solitary or cymose, often large and showy. Calyx inferior, persistent, usually of 5 distinct imbricated sepals. Corolla gamopetalous, hypogynous, campanulate or funnel-shaped or rotate, limb shortly or deeply 5-lobed or almost entire, often plaited and contorted in bud. Stamens 5, inserted on the tube of the corolla and alternate with its lobes; anthers oblong, opening lengthwise. Ovary superior, usually surrounded by an annular disc, 2–4-celled, rarely 1-celled, sometimes divided into 2–4 distinct carpels; style single or 2; stigma capitate or 2-lobed or branched; ovules usually 2 in each cell or carpel, erect, anatropous. Fruit a 1–4-celled capsule, 2–4-valved or bursting transversely or irregularly, rarely succulent and indehiscent. Seeds erect; albumen scanty or wanting; embryo curved, cotyledons broad, much folded and crumpled (in *Cuscuta* the embryo is spiral and undivided).

A moderately large family, widely spread over the whole world, but most plentiful in warm or tropical climates. Genera 40; species about 1000. As a rule, the roots abound in a milky and acrid juice, which is often strongly purgative and used in medicine, as jalap and scammony. In some species the roots are inert and edible, as the common sweet potato, so largely cultivated in all warm countries. Many species of *Ipomoea* and allied genera are grown for the sake of their large and showy flowers. All the New Zealand genera have a wide range.

* *Leafy plants, twining or prostrate.*

† Corolla plaited. Style single.

Ovary 2–4-celled. Stigma capitate, or lobes globose	1. Ipomoea.
Ovary imperfectly 2-celled. Stigmas 2, oblong, flat. Bracts large, enclosing the calyx	2. Calystegia.
Ovary 1-celled. Stigmas 2, linear, flat. Bracts small or wanting..	3. Convolvulus.

†† Corolla rotate. Styles 2.

Ovary of 2 separate carpels	4. Dichondra.

** *Leafless twining parasites.*

Corolla small, campanulate	5. Cuscuta.

1. **IPOMOEA** Linn.

Twining or prostrate herbs, rarely suberect. Leaves alternate, entire or lobed or divided. Flowers usually large and handsome, axillary, solitary or cymose. Sepals broad or narrow, equal or unequal, erect in

fruit or rarely spreading. Corolla campanulate or funnel-shaped; tube long or short; limb entire or 5-angled, more rarely slightly 5-lobed. Stamens included or exserted, often unequal; filaments filiform or dilated at the base; anthers oblong or linear, ultimately twisted or straight. Ovary 2-celled, 4-ovuled, rarely 4-celled and 4-ovuled or 3-celled and 6-ovuled; style filiform; stigma entire and capitate, or shortly 2-lobed with globular lobes. Capsule globose or ovoid, 4- or rarely 2–3-valved. Seeds as many as the ovules or fewer, glabrous or pubescent.

Taken in a wide sense, this is a genus of between 300 and 400 species, spread through all warm climates. Both the New Zealand species have a wide range in tropical countries.

Leaves digitately divided .. .. 1. *I. palmata.*

Leaves obtusely 2-lobed, thick and fleshy .. .. .. 2. *I. pes-caprae.*

The kumara or sweet potato (*Ipomoea batatas* Lamk., *Convolvulus chrysorhizus* Forst.) was introduced by the Maoris from Polynesia when they first colonized New Zealand, and constituted their chief vegetable food when the country became known to Europeans. It is still extensively grown, but has no claim to be included among the indigenous species.

1. **I. palmata** *Forsk. Fl. Egypt. Arab.* (1775) 43.—A slender glabrous twiner; stems many feet in length, the old ones more or less tuberculate. Leaves 1–3 in. diam., digitately divided almost to the base; lobes 5–7, lanceolate or elliptic-lanceolate, obtuse or subacute, entire or the outer ones irregularly lobed, rather membranous. Peduncles erect, 1–2 in. long, 1–3-flowered. Sepals $\frac{1}{4}$–$\frac{1}{3}$ in. long, ovate, obtuse or subacute. Corolla large, 2–3 in. diam., pale-purple with a darker centre. Capsule nearly $\frac{1}{2}$ in. diam., ovoid-globose, glabrous, 2-celled. Seeds 2–4, villous.—*Benth. Fl. Austral.* iv (1869) 415; *Cheesem. Man. N.Z. Fl.* (1906) 474. I. pendula *R. Br. Prodr.* (1810) 486; *A. Cunn. Precur.* (1838) n. 396; *Raoul Choix* (1846) 44; *Hook. f. Fl. Nov. Zel.* i (1853) 184. I. tuberculata *Roem. and Schultes Syst.* iv (1819) 208; *Hook. f. Handb. N.Z. Fl.* (1864) 199.

Kermadec Islands: Sunday Island, not uncommon on the cliffs, *T. F. C., W. R. B. Oliver!* North Island: Sea-cliffs from the North Cape to the Bay of Islands and Hokianga; Whangamumu, *R. Mair;* Sandy Bay, *T. F. C.;* sea-cliffs on Tiritiri Island, *A. Hansen!* December–April.

An abundant plant in the tropics of both hemispheres, attaining its southern limit in New Zealand.

(L)

2. **I. pes-caprae** *Roth. Nov. Sp. Plant.* (1821) 109.—Perfectly glabrous; stems prostrate or trailing, sometimes 40 ft. long. Leaves on petioles 1–4 in. long; blade often broader than long, 1–4 in. across, orbicular or broadly obovate or oblong, emarginate or shortly and obtusely 2-lobed, thick and fleshy, prominently veined. Peduncles about as long as the leaves, 1–3-flowered. Sepals ovate, obtuse. Corolla 1–2 in. diam., broadly campanulate with a somewhat tubular base, purplish or pink. Capsule $\frac{1}{2}$–$\frac{3}{4}$ in. long, ovoid-globose, coriaceous, 2-celled. Seeds large, hairy.—*Benth. Fl. Austral.* iv (1869) 419; *Cheesem. in Trans. N.Z. Inst.* xx (1888) 171; *Man. N.Z. Fl.* (1906) 474. Trans. 42:170.

Kermadec Islands: Sunday Island, abundant in the sandy bays and on some of the cliffs, *T. F. C., W. R. B. Oliver!* Plentiful on all tropical shores.

Easter Id

2. CALYSTEGIA R. Br. 1810

Prostrate or twining herbs, glabrous or nearly so. Leaves alternate, entire or rarely palmately lobed. Peduncles axillary, 1-flowered; bracts 2, large, persistent, enclosing the calyx. Flowers usually large. Sepals equal or the inner slightly smaller. Corolla campanulate or funnel-shaped; limb plaited, 5-angled or obscurely 5-lobed. Stamens included; filaments dilated at the base; anthers oblong. Ovary 1-celled or imperfectly 2-celled, 4-ovuled; style filiform; stigmas 2, ovate or oblong, flattened. Capsule subglobose, usually 1-celled. Seeds glabrous.

A small genus of 9 or 10 species, scattered through the warm and temperate regions of both hemispheres. Of the 4 New Zealand species 2 are found in most extra-tropical countries, 1 extends to Australia, and the remaining 1 to South America and the Island of Masafuera.

* Flowers large, 1–3 in. diam.

Leaves 2–5 in., oblong-sagittate, sinus at the base narrow, deep .. 1. *C. sepium.*
Leaves ½–1½ in., ovate-cordate or deltoid, membranous, sinus at the base broad, shallow .. .. 2. *C. tuguriorum.*
Stems, short, prostrate. Leaves ½–2 in. across, broader than long, reniform, fleshy, sinus at the base broad, shallow .. .. 3. *C. Soldanella.*

** Flowers small, ½ in. diam.

Leaves sagittate, basal lobes narrow, acute, diverging .. .. 4. *C. marginata.*

1. **C. sepium** *R. Br. Prodr.* (1810) 483. — Rhizome long, slender, extensively creeping underground. Stems slender, twining, 3–6 ft. long. Leaves alternate, variable in size and shape, 2–5 in. long, oblong-sagittate
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(1853)
m. Sp.

Calystegia sepium, R.Br.
(not native to N.Z. see T.N.Z.I.)
vol. 57, p. 62. (Ckn. & Allan).
probably an introduced + a native species.

Kermadec Islands, North and South Islands: Abundant in lowland situations as far south as Canterbury, apparently local in Otago. *Pohue; Panahe; Bindweed.* November–March.

Widely dispersed in most temperate countries, and everywhere highly variable.

2. **C. tuguriorum** *R. Br. ex Hook. f. Fl. Nov. Zel.* i (1853) 183, t. 47.— Stems slender, prostrate or climbing, often clothing shrubs or trees to a considerable height, glabrous or puberulous. Leaves ½–1½ in. long, broadly ovate-cordate or deltoid, acute or obtusely acuminate, entire or sinuate or angled, sinus at the base broad and shallow, glabrous, membranous. Peduncles usually longer than the leaves, terete or margined; bracts ovate-cordate or orbicular, apiculate, equalling the calyx and enclosing it. Sepals subequal, broadly ovate. Corolla large, 1–2 in. diam., white. Ovary incompletely 2-celled. Capsule ⅓ in. long, broadly ovoid, apiculate. Seeds yellowish-red.—*Cheesem. Man. N.Z. Fl.* (1906) 476. Convolvulus tuguriorum *Forst. f. Prodr.* (1786) n. 74; *Hook. f. Handb. N.Z. Fl.* (1864) 198. C. truncatella *Col. in Trans. N.Z. Inst.* xxi (1889) 95.

fruit or rarely spreading. Corolla campanulate or funnel-shaped; tube long or short; limb entire or 5-angled, more rarely slightly 5-lobed. Stamens included or exserted, often unequal; filaments filiform or dilated at the base; anthers oblong or linear, ultimately twisted or straight. Ovary 2-celled, 4-ovuled, rarely 4-celled and 4-ovuled or 3-celled and 6-ovuled; style filiform; stigma entire and capitate, or shortly 2-lobed with globular lobes. Capsule globose or ovoid, 4- or rarely 2–3-valved. Seeds as many as the ovules or fewer, glabrous or pubescent.

Taken in a wide sense, this is a genus of between 300 and 400 species, spread through all warm climates. Both the New Zealand species have a wide range in tropical countries.

Leaves digitately divided .. .. 1. *I. palmata.*
Leaves obtusely 2-lobed, thick and fleshy .. .. .. 2. *I. pes-caprae.*

The kumara or sweet potato (*Ipomoea batatas* Lamk., *Convolvulus chrysorhizus* Forst.) was introduced by the Maoris from Polynesia when they first colonized New Zealand, and constituted their chief vegetable food when the country became known to Europeans. It is still extensively grown, but has no claim to be included among the indigenous species.

1. **I. palmata** *Forsk. Fl. Egypt. Arab.* (1775) 43.—A slender glabrous twiner; stems many feet in length, the old ones more or less tuberculate. Leaves 1–3 in. diam., digitately divided almost to the base; lobes 5–7, lanceolate or elliptic-lanceolate, obtuse or subacute, entire or the outer ones irregularly lobed, rather membranous. Peduncles erect, 1–2 in. long, 1–3-flowered. Se[p]
large, 2–3 in. dia
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R. Br. Prodr. (18
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Kermadec Isl
W. R. B. Oliver! N
and Hokianga; Wh
Island, *A. Hansen!* December–April.

An abundant plant in the tropics of both hemispheres, attaining its southern limit in New Zealand.

(L)

2. **I. pes-caprae** *Roth. Nov. Sp. Plant.* (1821) 109.—Perfectly glabrous; stems prostrate or trailing, sometimes 40 ft. long. Leaves on petioles 1–4 in. long; blade often broader than long, 1–4 in. across, orbicular or broadly obovate or oblong, emarginate or shortly and obtusely 2-lobed, thick and fleshy, prominently veined. Peduncles about as long as the leaves, 1–3-flowered. Sepals ovate, obtuse. Corolla 1–2 in. diam., broadly campanulate with a somewhat tubular base, purplish or pink. Capsule ½–¾ in. long, ovoid-globose, coriaceous, 2-celled. Seeds large, hairy.—*Benth. Fl. Austral.* iv (1869) 419; *Cheesem. in Trans. N.Z. Inst.* xx (1888) 171; *Man. N.Z. Fl.* (1906) 474. Trans. 42:170.

Kermadec Islands: Sunday Island, abundant in the sandy bays and on some of the cliffs, *T. F. C., W. R. B. Oliver!* Plentiful on all tropical shores.

Sasta 14

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Stems, short, prostrate. Leaves ½–2 in. across, broader than long, reniform, fleshy, sinus at the base broad, shallow .. .. 3. *C. Soldanella.*

** Flowers small, ½ in. diam.

Leaves sagittate, basal lobes narrow, acute, diverging .. .. 4. *C. marginata.*

1. **C. sepium** *R. Br. Prodr.* (1810) 483. — Rhizome long, slender, extensively creeping underground. Stems slender, twining, 3–6 ft. long. Leaves alternate, variable in size and shape, 2–5 in. long, oblong-sagittate or hastate, acute or acuminate, rarely obtuse, cordate at the base with the lobes angular or truncate or rounded, membranous, glabrous or rarely slightly pubescent. Peduncles solitary, 1-flowered, angled or margined, often exceeding the leaves; bracts large, ovate or ovate-lanceolate, enclosing the calyx. Sepals subequal, ovate-lanceolate. Corolla large, 1½–3 in. diam., white or pink. Ovary incompletely 2-celled. Capsule ½ in. diam., globose, apiculate. Seeds smooth.—*A. Cunn. Precur.* (1838) 394; *Raoul Choix* (1846) 44; *Hook. f. Fl. Nov. Zel.* i (1853) 183; *Cheesem. Man. N.Z. Fl.* (1906) 475. Convolvulus sepium *Linn. Sp. Plant.* (1753) 153; *Hook. f. Handb. N.Z. Fl.* (1864) 197.

Kermadec Islands, North and South Islands: Abundant in lowland situations as far south as Canterbury, apparently local in Otago. *Pohue; Panahe; Bindweed.* November–March.

Widely dispersed in most temperate countries, and everywhere highly variable.

2. **C. tuguriorum** *R. Br. ex Hook. f. Fl. Nov. Zel.* i (1853) 183, t. 47.—Stems slender, prostrate or climbing, often clothing shrubs or trees to a considerable height, glabrous or puberulous. Leaves ½–1½ in. long, broadly ovate-cordate or deltoid, acute or obtusely acuminate, entire or sinuate or angled, sinus at the base broad and shallow, glabrous, membranous. Peduncles usually longer than the leaves, terete or margined; bracts ovate-cordate or orbicular, apiculate, equalling the calyx and enclosing it. Sepals subequal, broadly ovate. Corolla large, 1–2 in. diam., white. Ovary incompletely 2-celled. Capsule ⅓ in. long, broadly ovoid, apiculate. Seeds yellowish-red.—*Cheesem. Man. N.Z. Fl.* (1906) 476. Convolvulus tuguriorum *Forst. f. Prodr.* (1786) n. 74; *Hook. f. Handb. N.Z. Fl.* (1864) 198. C. truncatella *Col. in Trans. N.Z. Inst.* xxi (1889) 95.

North and South Islands, Chatham Islands: Abundant from the Three Kings Islands and the North Cape to Foveaux Strait. Stewart Island: Rare. December–February.

According to Sir J. D. Hooker, this is also found in Valdivia and Chiloe, and Mr. Hemsley (Bot. "Challenger" Exped.) has recorded it from the Island of Masafuera.

3. **C. Soldanella** *R. Br. Prodr.* (1810) 483.—Rhizome long, creeping underground. Stems rather stout, 6–18 in. long, rarely more, prostrate and trailing, not twining, glabrous or puberulous. Leaves on petioles 1–3 in. long; blade ½–2 in. diam., usually broader than long, reniform or broadly rounded-cordate, obtuse or apiculate, entire or sinuate, thick and fleshy, sinus at the base broad and shallow. Peduncles solitary, 1-flowered, as long or longer than the leaves; bracts ovate-cordate, obtuse, rather shorter than the calyx. Sepals subequal, broadly ovate, obtuse. Corolla large, 1–1½ in. diam., pink or purplish. Ovary incompletely 2-celled. Capsule large, broadly ovoid, apiculate. Seeds blackish-brown.—*A. Rich. Fl. Nouv. Zel.* (1832) 200; *A. Cunn. Precur.* (1838) n. 395; *Raoul Choix* (1846) 44; *Hook. f. Fl. Nov. Zel.* i (1853) 183; *Cheesem. Man. N.Z. Fl.* (1906) 476. Convolvulus Soldanella *Linn. Sp. Plant.* (1753) 159; *Hook. f. Handb. N.Z. Fl.* (1864) 198.

Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Not uncommon on sandy shores throughout; inland on sandy beaches at Lake Taupo, &c. November–March.

Easily distinguished by the short uniformly prostrate stems, fleshy reniform leaves, and large black seeds. It is a common plant on maritime sands on almost all temperate shores.

4. **C. marginata** *R. Br. Prodr.* (1810) 484.—Rhizome creeping; stems slender, twining, quite glabrous, 2–5 ft. long. Leaves on petioles 1–2 in. long; blade 1–3 in., sagittate, acute or acuminate, membranous; the basal lobes long, acute, diverging, often toothed or lobed. Peduncles usually shorter than the petioles, margined; bracts rounded-ovate, longer than the calyx. Sepals subequal, broadly ovate, obtuse. Corolla small, ½ in. diam., white. Ovary imperfectly 2-celled. Capsule globose; seeds usually 4.—*Hook. f. Fl. Nov. Zel.* i (1853) 184, t. 48; *Cheesem. Man. N.Z. Fl.* (1906) 477. Convolvulus marginatus *Poir. Encycl. Meth. Suppl.* ii (1811); *Hook. f. Handb. N.Z. Fl.* (1864) 198; *Benth. Fl. Austral.* iv (1869) 430.

North Island: Rare and local. Near Kaitaia, *R. H. Matthews!* Fairburn, *H. Carse!* between Mangonui and Whangaroa, *T. F. C.;* Whangarei and Owai, *Colenso;* Maungatapere, *H. Carse!* Paparoa, Omaha, and Thames, *T. Kirk!* Sea-level to 500 ft. December–March. Also in eastern Australia.

3. **CONVOLVULUS** Linn. 1735

Herbs or undershrubs, erect or prostrate or climbing. Leaves entire or toothed or lobed. Peduncles axillary, 1- or many-flowered; bracts usually narrow or small. Sepals subequal or the inner narrower. Corolla campanulate; limb plaited, 5-angled or obscurely 5-lobed. Stamens included; filaments filiform, dilated at the base; anthers oblong. Ovary 2-celled, 4-ovuled; style filiform; stigmas 2, distinct, oblong or linear. Capsule globose, 2-celled, 4-valved or splitting irregularly. Seeds glabrous.

A large genus of about 180 species, abundant in most subtropical or temperate countries, less plentiful in the tropics. The single New Zealand species is also found in Australia.

1. **C. erubescens** *Sims in Bot. Mag.* (1808) t. 1067.—Perennial; usually more or less silky-pubescent, rarely almost glabrous. Rootstock stout, creeping; stems few or many, slender, prostrate and trailing, variable in length, 2–12 in. long or more. Leaves petiolate, very variable in size and shape; the lower ones with a blade $\frac{1}{4}$–$\frac{3}{4}$ in. long, oblong-cordate or hastate, obtuse, quite entire or sinuate; in large specimens gradually passing into much narrower acute or acuminate upper ones, with diverging entire or irregularly toothed basal auricles; in small specimens the narrow cauline leaves are often wanting. Peduncles as long as the leaves or nearly so, 1-flowered, with 2 subulate bracts some distance below the calyx. Sepals broadly oblong, obtuse, silky. Corolla variable in size, $\frac{1}{3}$–$\frac{3}{4}$ in. diam., white. Capsule $\frac{1}{4}$–$\frac{1}{3}$ in. diam., globose, 2-celled. Seeds 4, rough, brownish-black.—*Hook. f. Fl. Nov. Zel.* i (1853) 185; *Handb. N.Z. Fl.* (1864) 198; *Benth. Fl. Austral.* iv (1869) 429; *Cheesem. Man. N.Z. Fl.* (1906) 477.

North Island: Hawke's Bay — Patangata, *Tryon!* Wellington—South-west head of Palliser Bay, *Colenso, Buchanan.* South Island: Marlborough—Banks of the Waihopai, *Monro;* Awarere Valley, *J. H. Macmahon!* inland Kaikouras, *Cockayne.* Canterbury — Canterbury Plains and Lake Forsyth, *T. Kirk!* Banks Peninsula, *R. M. Laing;* Lake Tekapo, *T. F. C.* Otago—Lower Waitaki, *Buchanan;* Cromwell, Lake Taieri, Clutha Valley, *Petrie!* Clyde, *Cockayne!* Sea-level to 3000 ft. December–March.

A remarkably variable little plant, closely allied to the common *C. arvensis* Linn. of the Northern Hemisphere. I have seen no specimens of Mr. Petrie's *C. fractosaxosa*, (Trans. N.Z. Inst. xlv (1913) 271), but, judging from the description, and recognizing how variable *C. erubescens* is, I should imagine that it is nothing but a reduced state of that plant, with the leaves and stems rather more hairy than usual.

4. **DICHONDRA** Forst.

Small prostrate or creeping perennial herbs. Leaves orbicular-cordate or reniform, entire. Flowers small, solitary, axillary. Sepals subequal, distinct to the base. Corolla broadly campanulate, deeply 5-lobed; lobes induplicate. Stamens shorter than the corolla; filaments filiform; anthers small. Ovary of 2 distinct lobes or carpels, each 1-celled with a basal style and 1 or 2 ovules. Capsules 2, membranous, erect, 1- or rarely 2-seeded, indehiscent or bursting irregularly.

A small genus of 4 or 5 species, widely spread in tropical and subtropical countries.

Leaves $\frac{1}{4}$–1 in. diam. Corolla shorter than the calyx or barely equalling it	1. *D. repens.*
Leaves $\frac{1}{8}$–$\frac{1}{4}$ in. diam. Corolla much longer than the calyx	2. *D. brevifolia.*

1. **D. repens** *Forst. Char. Gen.* (1776) 39, t. 20.—A small silky-pubescent creeping herb; stems slender, 2–12 in. long, rooting at the nodes, branched, often forming broad matted patches. Leaves alternate or tufted at the nodes, usually on long petioles; blade $\frac{1}{4}$–1 in. diam., reniform, emarginate or rounded at the apex, silky on both surfaces. Peduncles as long or longer than the petioles. Flowers small, greenish-yellow, about $\frac{1}{6}$ in. diam. Sepals obovate, silky. Corolla about equalling the sepals, rarely slightly longer. Capsules enclosed in the persistent calyx and shorter than it.—*Forst. f. Prodr.* (1786) n. 134; *A. Rich. Fl. Nouv. Zel.* (1832) 201; *A. Cunn. Precur.* (1838) n. 397; *Raoul Choix* (1846) 44; *Hook. f. Fl. Nov. Zel.* i (1853) 185; *Handb. N.Z. Fl.* (1864) 199; *Benth. Fl. Austral.* iv (1869) 438; *Cheesem. Man. N.Z. Fl.* (1906) 477.

North and South Islands, Chatham Islands: Abundant from the North Cape to Otago. Sea-level to 2500 ft. Spring and early summer.

A widely spread plant in the tropical and subtropical districts of both hemispheres, extending northwards to the United States on one side and China on the other.

2. **D. brevifolia** *Buch. in Trans. N.Z. Inst.* iii (1871) 208. — Much smaller and more densely matted than *D. repens*, often forming a compact turf. Leaves on short stout petioles; blade $\frac{1}{8}$–$\frac{1}{4}$ in. diam., orbicular-oblong or reniform, emarginate or rounded at the apex, cordate at the base, rather thick, silky on both surfaces or almost glabrous. Peduncles stout, erect, usually longer than the leaves. Flowers larger than in *D. repens*, $\frac{1}{4}$ in. diam., yellowish. Sepals obovate, silky. Corolla much longer than the sepals, sometimes twice as long. Ripe capsules about equalling the calyx.—D. repens *var.* brevifolia *T. Kirk in Trans. N.Z. Inst.* x (1878) app. xxxvii; *Cheesem. Man. N.Z. Fl.* (1906) 479.

North and South Islands, Stewart Island: Not uncommon throughout, ascending to 3000 ft. November–January.

I retain this as a species with considerable hesitation, but it appears to constantly differ from reduced states of *D. repens*, which it otherwise much resembles, in the larger flowers with the corolla always much longer than the calyx.

5. CUSCUTA Linn.

Leafless usually annual herbs, germinating in the soil but not rooting in it, producing filiform branched stems which twine round herbs or shrubs and become parasitic by means of suckers which penetrate the bark, the lower portion of the stem then dying away. Flowers small, usually whitish, in dense or open cymose fascicles, sessile or shortly pedicelled. Sepals 5 or 4, distinct or connate at the base. Corolla campanulate or urceolate or ovoid; lobes 5–4, short, imbricate in the bud. Stamens 5–4, inserted on the throat of the corolla, above a ring of many scale-like lacerate appendages. Ovary globose, 2-celled, 4-ovuled; styles 1 or 2, persistent; stigmas capitate or filiform. Capsule 1–4-seeded, membranous, dry or succulent, circumscissile or bursting irregularly. Seeds glabrous, albuminous; embryo long and slender, spirally coiled; cotyledons wanting or obscure.

A very remarkable genus, comprising about 90 species, spread through most tropical and temperate countries. Some of them, such as the clover dodder, *C. epithymum* var. *trifolii*, are dangerous pests to cultivated crops. The single New Zealand species is very imperfectly known, and may not be truly indigenous.

1. **C. densiflora** *Hook. f. Fl. Nov. Zel.* i (1853) 186. — Stems slender, densely matted and twisting together, as thick as stout thread. Flowers crowded in short densely congested 6–10-flowered racemes $\frac{1}{4}$–$\frac{1}{2}$ in. long. Calyx shortly 5-lobed; lobes oblong, obtuse. Corolla $\frac{1}{8}$ in. long, subcampanulate, marked with transparent oil-glands; lobes 5, short, rounded, recurved. Scales broadly oblong, obtuse, fimbriated, united at their bases by a thin membrane. Filaments longer than the anthers. Styles 2, rather long; stigmas capitate.—*Handb. N.Z. Fl.* (1864) 199.

South Island: Marlborough—Port Underwood, *Lyall.*

I have seen no specimens of this, and the above diagnosis has been drawn up from those given by Hooker in the Flora and the Handbook. According to Hooker, Dr. Engelmann, who examined the type at Kew, reported that it hardly differs from the

C. densiflora - see Engelmann Trans. Acad. Sc; St. Louis 1. 506: 1859

C. suaveolens densiflora (Hk f.) Yuncker Mem. Torr. Bot. Club. 18(2) 1932 149

South American *C. racemosa* Martius, a species which was introduced into Europe many years ago and caused much damage to crops of lucerne. It subsequently appeared in fields of lucerne in California. Mr. Kirk (Trans. N.Z. Inst. xx (1888) 182) records the occurrence of the same plant (under the synonym of *C. hassiaca* Pfeiff.) in lucerne-fields in Canterbury, but there are no specimens in his herbarium.

C. novae-zealandiae *T. Kirk in Trans. N.Z. Inst.* xx (1888) 183 (*name only*).—After a careful examination of the type specimens in Mr. Kirk's herbarium I have no hesitation in referring this to the northern *C. epithymum* Linn., which has been observed in many localities in the Dominion, and which often associates itself with the indigenous vegetation.

Family LXXXIX. **BORAGINACEAE.**

Annual or perennial herbs or more rarely trees or shrubs, usually rough with coarse hairs. Leaves alternate, seldom opposite, simple, entire or toothed; stipules wanting. Flowers regular, hermaphrodite, usually arranged in one-sided simple or forked gyrate spikes or racemes (in reality scorpioid cymes), rarely solitary. Calyx inferior, 5-lobed or -partite, persistent. Corolla gamopetalous, hypogynous; throat often closed with hairs or scales; lobes usually 5, seldom 4, imbricate. Stamens the same number as the lobes of the corolla and alternate with them, inserted on the tube or throat of the corolla; anthers 2-celled, opening lengthwise. Ovary superior, deeply 4-lobed and 4-celled in the majority of the species and in all those found in New Zealand, sometimes entire or 2-lobed; style from between the ovary-lobes or terminal; stigma capitate or 2-lobed; ovules solitary in each cell, ascending. Fruit usually composed of 4 indehiscent nutlets or pyrenes, rarely drupaceous. Seed erect or oblique, testa membranous; albumen copious or scanty or wanting; embryo straight or curved, radicle superior.

A large and widely distributed family, found in all parts of the world, the herbaceous genera most abundant in the Northern Hemisphere, especially in south Europe and the Levant; the shrubby and arborescent ones mainly tropical. Genera about 85; species estimated at 1600. The properties of the family are unimportant. Some of the species are mucilaginous and emollient, and have been used in medicine. The roots of others, such as *Anchusa* (alkanet), yield a red dye. The heliotrope, forget-me-not, and many others are cultivated for ornament. Of the three indigenous genera, *Myosotis* has a wide range in temperate climates; the remaining two are endemic.

* Calyx and corolla 5-lobed.

Leaves alternate. Racemes bractless. Nuts small, smooth and polished, on a flat receptacle	1. MYOSOTIS.
Leaves chiefly radical, large and broad. Nuts large, with broad wings, attached to a central conical receptacle	2. MYOSOTIDIUM.

** Calyx and corolla 4-lobed.

Small intricately branched herb. Leaves opposite	3. TETRACHONDRA.

1. **MYOSOTIS** Linn. 1735

Annual or perennial herbs, usually more or less hispid. Leaves alt—

Cuscuta densiflora, Hook.f.

perhaps not native to N.Z. see T.N.Z.I.

vol. 57, (1926) p. 63. (Ckn. & Allan).

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South American *C. racemosa* Martius, a species which was introduced into Europe many years ago and caused much damage to crops of lucerne. It subsequently appeared in fields of lucerne in California. Mr. Kirk (Trans. N.Z. Inst. xx (1888) 182) records the occurrence of the same plant (under the synonym of *C. hassiaca* Pfeiff.) in lucerne-fields in Canterbury, but there are no specimens in his herbarium.

C. novae-zealandiae *T. Kirk in Trans. N.Z. Inst.* xx (1888) 183 (*name only*).—After a careful examination of the type specimens in Mr. Kirk's herbarium I have no hesitation in referring this to the northern *C. epithymum* Linn., which has been observed in many localities in the Dominion, and which often associates itself with the indigenous vegetation.

Family LXXXIX. **BORAGINACEAE.**

Annual or perennial herbs or more rarely trees or shrubs, usually rough with coarse hairs. Leaves alternate, seldom opposite, simple, entire or toothed; stipules wanting. Flowers regular, hermaphrodite, usually arranged in one-sided simple or forked gyrate spikes or racemes (in reality scorpioid cymes), rarely solitary. Calyx inferior, 5-lobed or -partite, persistent. Corolla gamopetalous, hypogynous; throat often closed with hairs or scales; lobes usually 5, seldom 4, imbricate. Stamens the same number as the lobes of the corolla and alternate with them, inserted on the tube or throat of the corolla; anthers 2-celled, opening lengthwise. Ovary superior, deeply 4-lobed and 4-celled in the majority of the species and in all those found in New Zealand, sometimes entire or 2-lobed; style from between the ovary-lobes or terminal; stigma capitate or 2-lobed; ovules solitary in each cell, ascending. Fruit usually composed of 4 indehiscent nutlets or pyrenes, rarely drupaceous. Seed erect or oblique, testa membranous; albumen copious or scanty or wanting; embryo straight or curved, radicle superior.

A large and widely distributed family, found in all parts of the world, the herbaceous genera most abundant in the Northern Hemisphere, especially in south Europe and the Levant; the shrubby and arborescent ones mainly tropical. Genera about 85; species estimated at 1600. The properties of the family are unimportant. Some of the species are mucilaginous and emollient, and have been used in medicine. The roots of others, such as *Anchusa* (alkanet), yield a red dye. The heliotrope, forget-me-not, and many others are cultivated for ornament. Of the three indigenous genera, *Myosotis* has a wide range in temperate climates; the remaining two are endemic.

* Calyx and corolla 5-lobed.

Leaves alternate. Racemes bractless. Nuts small, smooth and polished, on a flat receptacle	1. MYOSOTIS.
Leaves chiefly radical, large and broad. Nuts large, with broad wings, attached to a central conical receptacle	2. MYOSOTIDIUM.

** Calyx and corolla 4-lobed.

Small intricately branched herb. Leaves opposite	3. TETRACHONDRA.

1. **MYOSOTIS** Linn.

Annual or perennial herbs, usually more or less hispid. Leaves alternate, entire, radical petioled, cauline sessile. Flowers small, blue or white or yellow, in scorpioid simple or branched racemes destitute of bracts, or in the axils of the upper leaves, rarely solitary and terminal. Calyx 5-lobed or -partite; lobes narrow, hardly altered in fruit. Corolla with a cylindrical tube partly closed with 5 small scales in the throat; limb

spreading, 5-lobed; lobes contorted in the bud. Stamens 5, affixed to the corolla-tube, included or exserted; anthers ovate or oblong. Ovary deeply 4-lobed; style filiform. Nutlets 4, ovoid-oblong, smooth and shining, attached by a small basal area.

A well-known genus of over 50 species, found in the temperate regions of both hemispheres, and particularly well represented in New Zealand, from which over 30 species are now known. One of the species extends to Australia, the rest are endemic. The great development of the genus in New Zealand, and the paucity of species in both Australia and South America, is one of the most remarkable features of the New Zealand Flora.

I have followed the "Genera Plantarum" and Engler and Prantl's "Pflanzenfamilien" in reducing *Exarrhena* to a section of *Myosotis*. Its distinguishing characters lie in the usually large campanulate corolla, the stamens inserted high up the corolla-tube between the scales, so that the anthers are altogether above the level of the scales and exserted beyond the tube, and in the filaments being usually (but not invariably) longer than the anthers. But *M. albo-sericea* and *M. Goyeni* have the corolla of *Exarrhena* with the stamens of *Myosotis*, while the position of the stamens on the corolla-tube varies in both *Myosotis* and *Exarrhena*.

The student must bear in mind that several species greatly resemble one another in habit and foliage, although widely different in the flowers. This is specially the case with *M. Forsteri*, a true *Myosotis*, and *M. petiolata*, an undoubted *Exarrhena*. *M. capitata*, *M. explanata*, *M. concinna*, and *M. macrantha* are all very near to one another in size, habit, and foliage, and all have unlike flowers.

Section I (Eumyosotis). *Stamens inserted on the corolla-tube; filaments shorter than the anthers, which are included in the tube, their tips not exceeding the corolla-scales.*

* Flowers solitary, sessile, terminal. Leaves small, imbricate.

Small, densely tufted, 2–6 in. diam. Leaves $\frac{1}{4}$ in., linear-oblong — 1. *M. uniflora.*
Small, densely tufted, 2–4 in. diam. Leaves $\frac{1}{6}$–$\frac{1}{4}$ in., obovate-spathulate — 2. *M. pulvinaris.*

** Flowers solitary and axillary or near the axils.

Stems many, sparingly branched, $\frac{1}{2}$–$1\frac{1}{4}$ in. long. Leaves obovate-oblong, $\frac{1}{4}$–$\frac{3}{4}$ in. Flowers blue — 3. *M. antarctica.*
Prostrate or decumbent, leafy, 1–6 in. long. Leaves often distichous. Flowers minute, $\frac{1}{10}$–$\frac{1}{8}$ in. long, white — 4. *M. pygmaea.*
Annual, sparingly and diffusely branched, almost flaccid. Cauline leaves remote. Flowers opposite the axils, $\frac{1}{8}$–$\frac{1}{6}$ in. diam. — 5. *M. tenericaulis.*
Small, densely tufted, 1–3 in. diam. Leaves crowded. Flowers few, $\frac{1}{3}$ in. long, corolla-tube twice as long as the calyx — 6. *M. Cheesemanii.*
Prostrate or decumbent, leafy, 1–2 in. long. Flowers rather large, $\frac{1}{4}$–$\frac{1}{3}$ in. long. Anthers long, narrow-linear — 7. *M. decora.*

*** Flowers in terminal racemes without bracts, or the lower flowers alone axillary.

† Racemes short, stout, capitate.

Stout, erect, 4–8 in. high. Radical leaves $1\frac{1}{2}$–4 in. Racemes forming a broad capitate head. Flowers $\frac{1}{4}$ in. diam., blue; anthers below the corolla-scales — 8. *M. capitata.*
Stout, erect or ascending, 8–18 in. high. Radical leaves 3–6 in. long. Racemes forming broad capitate heads. Flowers $\frac{1}{5}$–$\frac{1}{4}$ in., white; anthers altogether above the corolla-scales — 9. *M. albida.*
Stout, erect, 6–12 in. high. Leaves submembranous, sparsely hispid. Racemes short, stout, capitate. Flowers $\frac{2}{3}$ in. diam., white — 10. *M. explanata.*
Short, stout, densely hispid, 2–6 in. Leaves linear-spathulate. Racemes short, capitate. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. long, lemon-yellow. Filaments very short, the tip of the anthers just above the scales — 11. *M. Traversii.*
Size and habit of *M. Traversii*, but leaves narrower. Racemes capitate. Flowers $\frac{1}{3}$ in., white. Filaments as long as the anthers, which are wholly above the scales — 12. *M. angustata.*

Stems few, slender, 3–5 in. high. Radical leaves numerous. Racemes simple or branched, divisions compact. Flowers $\frac{1}{3}$ in., white. Anther-tips barely reaching the tops of the corolla-scales .. .. 13. *M. saxatilis.*

Stems stouter, 2–5 in. Radical leaves $\frac{3}{4}$–$1\frac{1}{2}$ in., obovate-spathulate. Racemes simple or sparingly branched. Flowers crowded, white, sweet-scented, $\frac{1}{2}$ in. long .. .. 14. *M. suavis.*

†† Racemes long and slender.

Slender, 3–6 in. high, white with appressed silky hairs. Flowers yellow, $\frac{1}{3}$ in. long. Corolla campanulate, with a short tube and broad limb .. .. 15. *M. albo-sericea.*

Slender, 4–10 in. high, hispid with short white hairs. Flowers pale-yellow or white, large, campanulate, tube shorter than the limb 16. *M. Goyeni.*

Slender, erect, densely hispid, 6–16 in. high. Flowers yellow or white, pedicels short, erect. Nutlets ovoid, black .. .. 17. *M. australis.*

Slender, weak, diffuse, 6–18 in. long. Racemes elongated, lower flowers often axillary. Flowers white or white with a yellow eye, pedicels spreading. Nutlets broadly ovoid, pale .. .. 18. *M. Forsteri.*

Section II (Exarrhena). *Stamens usually inserted between the corolla-scales; filaments longer than the anthers, which always reach beyond the corolla-tube, and sometimes exceed the lobes.*

* Flowers at or near the axils of the leaves.

Prostrate or decumbent, ascending at the tips. Leaves on slender petioles, blade orbicular or obovate, $\frac{1}{3}$–1 in. long. Flowers small, $\frac{1}{8}$–$\frac{1}{6}$ in. Corolla-tube shorter than the limb .. .. 19. *M. spathulata.*

** Racemes usually long and slender; flowers distant.

Slender, diffuse, 6–14 in. high. Leaves on slender petioles; blade orbicular or obovate-oblong, $\frac{2}{3}$–2 in. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. diam. Corolla-tube shorter than the limb .. .. .. 20. *M. petiolata.*

Slender, decumbent below, 6–12 in. high. Radical leaves 2–4 in. long, blade $\frac{1}{2}$ as long, linear-obovate to oblong-obovate. Flowers $\frac{1}{4}$ in. diam. Calyx-tube hispid. Corolla funnel-shaped, tube equalling the calyx, limb rather small .. .. .. 21. *M. Astoni.*

Stems few or many, 3–6 in. high. Leaves spathulate to linear-oblong, blade $\frac{1}{2}$–1 in., hispid above, often almost glabrous beneath. Racemes few-flowered. Calyx coarsely hispid. Corolla-tube cylindric, much longer than the calyx; limb broad and flat. Anthers wholly above the scales .. .. 22. *M. Townsoni.*

*** Racemes long and slender, naked below.

Slender, 6–12 in. high. Leaves membranous, sparsely hispid. Flowers $\frac{1}{3}$–$\frac{1}{2}$ in. long. Corolla campanulate; tube broad, shorter than the limb .. .. 23. *M. laeta.*

Slender, 12–18 in. high. Leaves 3–6 in., clothed with soft white hairs. Flowers large, crowded, $\frac{1}{2}$–$\frac{3}{4}$ in. long, yellow. Corolla narrow-campanulate, tube $\frac{1}{2}$ the length; limb large, deeply lobed 24. *M. Laingii.*

**** Racemes short, stout, compactly flowered.

Flowering stems leafy, 3–9 in. high. Radical leaves 1–$2\frac{1}{2}$ in., obovate-spathulate, hoary. Flowers large, white, $\frac{1}{2}$–$\frac{2}{3}$ in. long. Corolla campanulate, tube exceeding the calyx, limb large .. 25. *M. amabilis.*

Flowering stems leafy below, naked above. Leaves oblong-spathulate or oblanceolate, 2 in., cauline acute. Flowers large, $\frac{3}{4}$ in., white with a yellow eye. Corolla campanulate .. 26. *M. eximia.*

Small, stout, 2–4 in. Leaves $\frac{1}{2}$–$\frac{3}{4}$ in., oblong-spathulate, hispid on both surfaces. Racemes few-flowered .. .. .. 27. *M. saxosa.*

Stout, 2–6 in. high. Leaves $\frac{3}{4}$–$1\frac{1}{2}$ in. long, oblong-spathulate, sparingly hispid. Flowers $\frac{1}{4}$ in. long. Corolla funnel-shaped, tube longer than the limb .. .. 28. *M. Lyallii.*

Small, 2–6 in. high. Leaves $\frac{3}{4}$–2 in., lanceolate- to obovate-spathulate, hispid on both surfaces or almost glabrous beneath. Flowers yellow, $\frac{1}{4}$–$\frac{1}{3}$ in. long. .. .. 29. *M. Monroi.*

***** Racemes many-flowered, simple or branched, elongating in fruit; flowers large, showy.

Erect, silky with appressed hairs, 6–14 in. high. Flowers numerous, crowded, bright-yellow. Corolla broadly funnel-shaped, tube broad, shorter than the limb	30. *M. concinna.*
Erect, hispid with spreading or appressed hairs, 6–14 in. high. Flowers large, crowded, brownish-orange, ⅔–1 in. long. Corolla-tube twice as long as the limb	31. *M. macrantha.*

1. **M. uniflora** *Hook. f. Handb. N.Z. Fl.* (1864) 192.—A small much and closely branched densely tufted perennial herb, forming rounded patches 2–6 in. diam., everywhere clothed with appressed rigid white hairs, giving the whole plant a greyish-white appearance; root woody, tortuous; branches densely leafy. Leaves closely imbricated, erect, ¼ in. long, linear-oblong or linear-lanceolate, obtuse or subacute, dilated at the base, almost glabrous above. Flowers solitary, terminal, almost sessile, about ¼ in. long, yellowish-white. Calyx-lobes linear-oblong, acute, clothed with straight rigid hairs. Corolla-tube cylindrical, twice as long as the calyx, throat with 5 emarginate scales; limb flat, spreading; lobes 5, short, rounded. Stamens 5; filaments very short; anthers linear-oblong, included, their tips just above the level of the corolla-scales. Nuts ovoid, acute.—*Cheesem. Man. N.Z. Fl.* (1906) 460; *Cockayne and Foweraker in Trans. N.Z. Inst.* xlviii (1916) t. 16.

South Island: Canterbury—Sources of the Waimakariri, *J. D. Enys! T. F. C.*; Cass River, *Cockayne* and *Foweraker!* Rangitata River, *J. B. Armstrong! W. W. Smith!* Wilberforce River, *Haast!* stony river-bed in the Tasman Valley, *T. F. C.*; Hopkins River, *Haast.* 2500–4500 ft. December–February.

A very curious little plant. It is usually found on the stony river-beds near the sources of the larger Canterbury rivers. The *M. uniflora* of Buchanan (Trans. N.Z. Inst. xiv (1882) t. 33, f. 1) appears to me to be referable to the next species.

2. **M. pulvinaris** *Hook. f. Handb. N.Z. Fl.* (1864) 193.—A small much-branched densely tufted perennial herb, forming soft rounded cushions 2–4 in. diam., more or less clothed with soft white hairs; branches short, densely compacted. Leaves most densely imbricated all round the branches, erect, closely overlapping, ⅛–¼ in. long, broadly obovate or obovate-spathulate, rounded at the tip, slightly narrowed to a broad sessile base, rather membranous, both surfaces clothed with long soft hairs or the lower ½ glabrous. Flowers white, solitary, terminal, almost sessile, about ¼ in. long. Calyx-lobes linear, acute, densely clothed with long straight hairs. Corolla-tube about twice as long as the calyx, throat with 5 scales; lobes 5, short, rounded, spreading. Stamens included, the tips of the anthers slightly above the level of the corolla-scales. Nuts ovoid, acute.—*Buch. in Trans. N.Z. Inst.* xiv (1882) t. xxxiii, f. 2; *Cheesem. Man. N.Z. Fl.* (1906) 460. M. Hectori *Hook. f. Handb. N.Z. Fl.* (1864) 193; *Buch. l.c.* t. xxxiii, f. 3.

South Island: Canterbury—Locality not stated, *J. B. Armstrong!* Otago—Mount Alta, *Hector* and *Buchanan!* Mount Pisa, Old Man Range, Hector Mountains, Mount Cardrona, and other high peaks to the west and north-west, *Petrie!* Eyre Mountains, *Poppelwell!* 4000–6500 ft. January–March.

Very variable in the shape and texture of the leaves and the extent to which they are covered with hairs. *M. Hectori* only differs in the rather broader and shorter leaves, and passes so insensibly into the type that it cannot be retained even as a variety.

M. tenuis S. & T. Trans. 73:161.

3. **M. antarctica** *Hook. f. Fl. Antarct.* i (1844) 57, t. 38.—Root perennial, fusiform; rootlets numerous, fibrous. Stems many from the root, short, ½–1¼ in. long, sparingly branched, outer spreading, inner ascending or erect. Leaves numerous, the lower sometimes imbricate at the base, the upper farther apart; radical larger, ¾ in. long at most, obovate-oblong or oblong-spathulate, obtuse, scarcely coriaceous; upper surface densely clothed with spreading or appressed stiff white hairs; under-surface much more sparingly covered; cauline leaves smaller and narrower, obtuse or subacute. Flowers small, $\frac{1}{10}$ in. long, axillary, blue; lower shortly pedicelled, upper sessile. Calyx narrow-oblong, densely hispid: lobes ½ the length of the corolla, linear-subulate. Corolla-tube narrow-cylindric; limb flattened, segments rounded-obovate. Corolla-scales at the base of the segments, large. Stamens 5; filaments very short; anthers ovate, acute, their tips well below the bottom of the corolla-scales.—*Fl. Nov. Zel.* i (1853) 201; *Handb. N.Z. Fl.* (1864) 193; *Cheesem. Man. N.Z. Fl.* (1906) 461 (*all in part*).

Campbell Island: Rocky debris at the base of precipices and in clefts on the mountains, *Hooker, R. M. Laing!*

After careful examination of all available evidence, I have decided to limit the name of *antarctica* to Hooker's original plant from Campbell Island. This differs (judging from his original description and plate) from the New Zealand plants associated with it of late years in the colour of the flowers, which are bright-blue, and in the anthers being placed much lower down the corolla-tube than in the New Zealand plant. This peculiarity is borne out by an examination of flowers collected by Laing in Campbell Island.

4. **M. pygmaea** *Col. in Trans. N.Z. Inst.* xvi (1884) 334.—Very variable in size, annual or perennial, more or less clothed in all its parts with stiff white hairs. Stems few or many from the root, prostrate or decumbent, ascending at the tips, usually densely leafy. Radical leaves ¼–1¼ in. long, narrow obovate-spathulate or oblong-spathulate, obtuse or apiculate, sessile or narrowed into a petiole of variable length, membranous or subcoriaceous; cauline smaller, sessile, often distichous. Flowers solitary and axillary, few or many to a stem, sessile or nearly so, minute, white or yellowish. Calyx cut about half-way down, hispid with long straight hairs, enlarged and open in fruit; lobes linear-lanceolate or ovate-lanceolate, acute. Corolla-tube variable in length, in some forms barely exceeding the calyx, in others almost twice as long, throat with 5 scales; lobes short, rounded. Stamens included; anther-tips usually reaching to the level of the corolla-scales. Nutlets ovoid, acute, compressed, shining, black or nearly so.—*M. antarctica* of Hook. f. and other writers, so far as strictly N.Z. specimens are concerned. M. Traillii *T. Kirk in Trans. N.Z. Inst.* xvi (1884) 373.

See Trans. 46: 63.

North and South Islands, Stewart Island: Not uncommon from the Auckland Isthmus southwards, usually in dry rocky places. Sea-level to 5000 ft. November–February.

An extremely variable little plant. Specimens from dry alpine localities are often densely tufted, almost pulvinate, and are usually clothed with long villous hairs. On the other hand, I have specimens from shaded places near the Waimakariri Glacier with slender prostrate sparingly leafy stems 6 in. long, with radical leaves 2 in. long. Mr. Kirk's subspecies *Traillii* does not seem to me to differ in any essential particular from Colenso's *M. pygmaea*, and as that name is entitled to priority I have adopted it here to distinguish both *M. pygmaea* and *M. Traillii* from the Campbell Island *M. antarctica*, which should rank as a separate species.

var. glauca S+T. 72: 26. (Trans)
717 Mt Ida

5. **M. tenericaulis** *Petrie in Trans. N.Z. Inst.* l (1918) 209.—Probably annual. Stems usually many from the root, 9–15 in. long, very thin and slender, almost flaccid, sparingly and diffusely branched, slightly clothed with thin appressed hairs or almost glabrous. Radical leaves few; blade ½–1 in. long, oblong or oblong-obovate, very thin and membranous, sparingly clothed on both surfaces with appressed whitish hairs, midrib evident, at the base gradually narrowed into a slender petiole twice as long as the blade or nearly so. Cauline leaves remote, smaller, narrow-obovate, the uppermost sessile, the lower shortly petiolate. Flowers opposite to the axils of the upper cauline leaves, distant, shortly pedicelled. Calyx narrow, about $\frac{1}{12}$ in. long, cut down nearly to the base into linear-subulate lobes, sparingly clothed with appressed hairs. Corolla $\frac{1}{8}$–$\frac{1}{6}$ in. diam., narrow funnel-shaped; tube ½ as long again as the calyx, throat with 5 short and broad scales; limb with 5 rounded segments. Stamens included; filaments very short; anther-tips not reaching the level of the corolla-scales. Nutlets ovoid, shining yellow-brown.

South Island: Otago—Inch-Clutha, *Petrie!* Winton, *T. Kirk!*

In the first edition I included this plant within my conception of *M. spathulata*, pointing out, however, that the structure of the flower was altogether different, and that it would probably prove to be a distinct species. In point of fact, *M. spathulata* falls into the section *Exarrhena*, having the stamens exserted beyond the corolla-tube; while *M. tenericaulis* has the stamens included within the tube, and must be placed within the section *Eumyosotis*. Its external resemblance to *M. spathulata* is very close, and it is quite possible that it may have been taken for that species in other districts.

6. **M. Cheesemanii** *Petrie in Trans. N.Z. Inst.* xviii (1886) 296.—A small perennial herb forming tufts 1–3 in. diam., more or less clothed in all its parts with long soft white hairs. Stems several from the root, 1–1½ in. long, spreading or ascending, densely leafy. Lower leaves ¼–½ in. long, obovate-spathulate, usually rounded at the tip, narrowed into a broad membranous almost glabrous 3-nerved base, upper portion coriaceous, hispid on both surfaces, margins ciliate with long hairs; cauline leaves smaller and narrower, more acute. Flowers 1–4 towards the tips of the branches, solitary, axillary, ⅓ in. long, white, sweet-scented. Calyx clothed with long straight hairs, 5-lobed to the middle; lobes lanceolate or linear-lanceolate, erect, acute. Corolla-tube funnel-shaped, almost twice as long as the calyx, throat with 5 lunate glands; lobes spreading, short, broad, rounded. Stamens included; filaments very short; the tips of the anthers equalling or slightly overtopping the corolla-scales. Nutlets narrow-ovoid, dark-brown, polished, acute.—*Cheesem. Man. N.Z. Fl.* (1906) 461.

South Island: Nelson—Mount Percival, *T. F. C.*; summit of Mount Captain, *C. E. Christensen!* Otago—Mount Pisa and the Hector Mountains, *Petrie!* 4500–6000 ft.

A very pretty and distinct little species. In some respects it is allied to *M. Traversii*, but it is much smaller and more densely tufted, and the flowers are axillary, not racemose.

M. colensoi (Kirk) Cheesem. Trans. 56: 1926. 28

7. **M. decora** *T. Kirk in Cheesem. Man. N.Z. Fl.* (1906) 462.—Perennial; hoary in all its parts with appressed rigid white hairs. Stems 1–2 in. long, prostrate or decumbent, suberect at the tips, leafy throughout. Radical leaves numerous, spreading, ½–1¼ in. long, linear-oblong or linear-spathulate, acute, narrowed into a short broad petiole, coriaceous, both surfaces clothed with appressed stiff hairs; cauline much smaller, the upper ones sessile. Flowers solitary in the axils of the upper leaves, white, ¼–⅓ in.

long, pedicels short. Calyx densely hispid with stiff white hairs, 4-lobed to the middle; lobes linear, acute. Corolla-tube longer than the calyx, throat with 5 scales; limb broad, with 5 rounded lobes. Stamens with very short filaments; anthers very long, linear, their tips projecting considerably above the level of the corolla-scales. Style long, slender. Nutlets oblong, smooth and polished, black.—Exarrhena Colensoi *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 351 (*in part*).

South Island: Canterbury—Limestone rocks in the Broken River basin, *J. D. Enys! T. Kirk! Cockayne! T. F. C.* 2000–3500 ft. December–January.

A curious little plant, remarkable for the large linear anthers, the tips of which stand up considerably above the corolla-scales.

8. **M. capitata** *Hook. f. Fl. Antarct.* i (1844) 56, t. 37.—Perennial; clothed in all its parts with soft spreading scarcely hispid hairs; rootstock long; stems one or several from the root, stout, ascending, simple, leafy. Radical leaves numerous, spreading, 1½–4 in. long, linear-obovate or linear-oblong or spathulate, obtuse, narrowed into a short broad petiole, clothed with soft spreading or appressed hairs above, much less hairy beneath; cauline smaller, the upper ones sessile. Racemes short, stout, simple or branched, usually forming a dense many-flowered head. Flowers ¼ in. long, ⅕–¼ in. diam., shortly pedicelled, blue. Calyx hispid with appressed straight hairs, 5-lobed ¾-way down; lobes linear, obtuse. Corolla-tube ⅓ longer than the calyx, cylindrical, throat with 5 scales; limb flat, spreading, with 5 rounded lobes. Stamens included; filaments very short; anther-tips just below the level of the scales. Style long, slender. Nutlets ovoid, smooth and shining, black.—*Handb. N.Z. Fl.* (1864) 194; *Cheesem. Man. N.Z. Fl.* (1906) 463; *Subantarct. Is. N.Z.* (1909) 423.

Auckland Islands: Open hillsides and rocky places, *Hooker, T. Kirk! Chapman! Cockayne! B. C. Aston!* Campbell Island: *Filhol! T. Kirk, R. M. Laing.* Sea-level to 1200 ft. December–February.

A handsome plant, very well figured and described by Hooker in the "Flora Antarctica." Its nearest ally is the white-flowered *M. albida.*

9. **M. albida** *Cheesem. in Subantarct. Is. N.Z.* (1909) 423.—Perennial. Rhizome long, stout, horizontal or oblique, emitting thick fibrous rootlets, clothed at the top with the remains of withered leaves. Stems or flowering branches numerous, stout, ascending, usually decumbent at the base, 8–18 in. high, everywhere densely clothed with short soft spreading hairs. Radical leaves numerous, 3–6 in. long, ½–1 in. broad, thick, flat, linear-obovate or linear-spathulate to linear-oblong, obtuse, gradually narrowed into a broad flat petiole, densely clothed on both surfaces with short white hairs. Cauline leaves few, smaller and narrower. Racemes terminal or in the axils of the upper leaves, pedunculate, simple or forked, scorpioid, capitate. Flowers very numerous, crowded, shortly pedicelled. Calyx ⅕ in. long, thickly set with whitish hairs; lobes linear-oblong, obtuse. Corolla hypocrateriform, white; tube long, narrow-cylindric, ½ as long again as the calyx, throat with 5 scales; limb ⅕ in. diam., flat; lobes rounded. Stamens 5; filaments equal in length to the anthers; anthers standing altogether above the level of the corolla-scales. Nutlets ovoid, acute, shining, black.

South Island: Otago—Cliffs on the eastern and southern coasts, *Lindsay, Buchanan! Petrie!* Stewart Island and Islands in Foveaux Strait: Plentiful on coastal cliffs, *J. W. Stack, Petrie! T. Kirk! Cockayne! Poppelwell.* The Snares and Solanders: *T. Kirk! Cockayne.* December–February.

Differs from *M. capitata* in the larger size and stouter habit, and in being far more copiously hairy. The inflorescence is more developed, and the flowers are white. But the most important difference is in the position of the anthers, which stand altogether above the level of the corolla-scales, not below, as in *M. capitata.*

10. **M. explanata** *Cheesem. Man. N.Z. Fl.* (1906) 464. — Perennial; clothed in all its parts with short hardly rigid spreading white hairs; rootstock long, stout; stems usually numerous, simple, decumbent below, ascending or suberect above, leafy, 6–12 in. high. Radical leaves numerous, 2–4 in. long, linear-obovate or oblong-spathulate or linear-spathulate, obtuse or rarely subacute, narrowed into rather long broad petioles, membranous, uniformly but rather sparsely clothed on both surfaces with short soft white hairs; cauline smaller, sessile, linear-oblong or lanceolate. Racemes short, simple or branched, many-flowered, in the early flowering stage forming dense heads. Flowers large, $\frac{1}{2}$ in. long, $\frac{1}{2}$–$\frac{2}{3}$ in. diam., pure-white, very shortly pedicelled. Calyx rather more than $\frac{1}{3}$ in. long, hispid with straight or curved hairs; lobes linear, obtuse. Corolla-tube slightly longer than the calyx, slender, cylindrical, throat with 5 scales; limb broad, flat, spreading, with 5 rounded lobes. Stamens included; filaments very short; anther-tips level with the corolla-scales. Style long, slender. Nutlets narrow-oblong, obtuse, shining, black.—*Ill. N.Z. Fl.* ii (1914) t. 143.

South Island: Canterbury—Mountains above Arthur's Pass, *T. F. C., Cockayne!* Walker's Pass, *Cockayne.* 3000–4500 ft. January.

A very handsome plant. It differs from the typical state of *M. capitata* in the large pure-white flowers (which are quite twice the size of those of *M. capitata*), in the large calyx, and in the more membranous less hairy leaves. *M. albida* recedes in its larger size and coarser habit, and particularly in the anthers, which are altogether above the level of the corolla-scales, whereas they are always below in *M. explanata.*

11. **M. Traversii** *Hook. f. Handb. N.Z. Fl.* (1864) 194. — Perennial; much branched from the base, 2–6 in. high; everywhere densely hispid with erect or spreading straight or hooked stiff white hairs; rootstock long, stout; stems erect or ascending, stout, leafy. Radical leaves 1–1$\frac{1}{2}$ in. long, $\frac{1}{5}$–$\frac{1}{3}$ in. broad, linear-spathulate, obtuse, narrowed into short petioles, coriaceous, both surfaces rough and hispid; cauline numerous, linear-oblong, sessile, erect. Racemes many-flowered, short, simple or branched, capitate, very densely hispid. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. long, sessile or nearly so, lemon-yellow, sweet-scented. Calyx densely hispid with straight or hooked hairs, deeply 5-lobed; lobes linear, acute. Corolla-tube $\frac{1}{3}$ longer than the calyx, narrow funnel-shaped, throat with 5 scales; lobes short, rounded. Stamens included; filaments very short; anthers with their tips just above the level of the scales. Style slender, almost equalling the corolla. Nutlets narrow-ovoid, obtuse, polished and shining, brownish-black.—*Cheesem. Man. N.Z. Fl.* (1906) 464. M. cinerascens *Petrie in Trans. N.Z. Inst.* l (1918) 207.

Var. **Cockayniana** *Cheesem.* — Very similar to the type, but stouter and more copiously covered with stiffer and whiter appressed hairs. Structure of flowers exactly as in the type.—M. Cockayniana *Petrie in Trans. N.Z. Inst.* xlv (1913) 269.

South Island: Bare shingle-slopes on the higher mountains, not uncommon in Nelson, Marlborough, Canterbury, and Westland, less abundant in Otago. Var. *Cockayniana:* Shingle-slopes in the Upper Awatere, *Cockayne!*

A well-marked plant, whose nearest ally is the following species.

12. **M. angustata** *Cheesem. Man. N.Z. Fl.* (1906) 465.—Size, habit, and general appearance of *M. Traversii*, and like it everywhere densely hispid with straight or hooked stiff white hairs. Leaves usually narrower, ½–1½ in. long, ⅛–⅙ in. broad, narrow linear-spathulate, obtuse or subacute, gradually narrowed towards the base. Racemes many-flowered, short, simple or branched, when young forming a capitate head to the branches, very densely hispid. Flowers about ⅓ in. long, sessile or nearly so, white. Calyx densely hispid with straight or hooked hairs, divided about ⅔-way down; lobes linear, erect, acute. Corolla-tube longer than the calyx, cylindrical, throat with 5 scales; lobes short, rounded. Stamens with filaments as long as the anthers, so placed that the anthers are wholly above the level of the scales, their tips reaching half-way up the corolla-lobes. Style slender, exceeding the corolla. Ripe fruit not seen.

South Island: Nelson—Mount Lockett, *F. G. Gibbs!* Mount Arthur Plateau and the Raglan Mountains, *T. F. C.* Canterbury—Broken River basin, *Cockayne!* Hooker Valley, Mount Cook district, *T. F. C.* 3500–4500 ft. January.

At first sight there seems to be little to separate this from *M. Traversii* beyond the slightly narrower leaves and white flowers. But on dissecting the flowers it will be noticed that the position of the anthers is altogether different; for in *M. Traversii* the filaments are exceedingly short, so that the tips of the anthers are only just above the corolla-scales, whereas in the present plant the filaments equal the anthers in length, which are altogether above the level of the scales. Technically, the species should be placed in the section *Exarrhena*, but I am unwilling to remove it from the vicinity of *M. Traversii*.

13. **M. saxatilis** *Petrie in Trans. N.Z. Inst.* l (1918) 208.—Perennial; everywhere hoary with appressed whitish hairs. Stems few, slender, decumbent at the base and then erect, 3–5 in. high. Radical leaves numerous, forming a rosette at the base of the stem, 1–1½ in. long, obovate-lanceolate to linear-spathulate, obtuse or subacute, somewhat membranous, gradually narrowed into long broad petioles, both surfaces clothed with stiff white hairs; midrib evident. Cauline leaves smaller, few, distant, sessile or the lowermost shortly petiolate, acute or subacute. Racemes simple or sparingly branched; divisions short, compact. Flowers white, numerous for the size of the plant, ⅓ in. long. Calyx deeply 5-partite; lobes linear-lanceolate, acute, densely clothed with erect or spreading hairs. Corolla-tube as long again as the calyx; throat with 5 scales; limb broad, flat, with rounded lobes. Stamens included; filaments very short; anther-tips barely reaching the level of the corolla-scales. Ripe nutlets not seen.

South Island: Marlborough—Shingly Range in the Awatere Valley, 4000 ft., *Cockayne!*

The structure of the flower places this interesting species in the *Eumyosotis* section. For the present I place it in the vicinity of *M. explanata* and *M. Traversii*; but it is by no means closely allied to either. I have only seen one good specimen.

14. **M. suavis** *Petrie in Trans. N.Z. Inst.* xlvi (1914) 34.—Perennial; covered in all its parts with long soft white hairs; root long, stout. Flowering stems few from the top of the root, 2–5 in. high, decumbent at the base, erect or ascending above. Radical leaves not very numerous, ¾–1½ in. long, ½–¾ in. broad, broadly obovate-spathulate, obtuse or apiculate, somewhat fleshy, narrowed into short broad petioles, both surfaces covered with soft white hairs; midrib evident. Cauline leaves usually many, sometimes very closely placed, oblong or oblong-lanceolate, acute or subacute, under-surface less pilose than the upper. Racemes simple or sparingly branched. Flowers crowded, numerous, white, sweet-scented, ½ in. long.

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Calyx deeply 5-partite; lobes narrow-linear, acute. Corolla funnel-shaped, nearly twice as long as the calyx, throat with 5 scales, limb divided into 5 rounded lobes. Stamens included; filaments very short; anther-tips reaching the top of the corolla-scales. Ripe nutlets not seen.

South Island: Canterbury—Slopes of Mount Sefton, between the Huddlestone and Stocking Glaciers, and near the Stewart Glacier (Mount Cook district), *P. Graham!* Forbes River, Upper Rangitata Valley, *A. Wall!* 3500–5000 ft. February.

Not very remote from the preceding species; but the habit is stouter; the radical leaves broader, more obtuse, and rather thicker in texture, while the hairs are softer and longer. The cauline leaves, too, are much more numerous. The structure of the flowers is very similar in the two plants. T. 75: 192

15. **M. albo-sericea** *Hook. f. Handb. N.Z. Fl.* (1867) 738.—Perennial; everywhere silvery-white with closely appressed silky hairs; rootstock stout, woody, clothed with the remains of the old leaves; flowering stems one or several, rather slender, 3–6 in. high. Radical leaves very numerous, densely tufted, ½–1 in. long, $\frac{1}{10}$–⅛ in. wide, narrow linear-spathulate, acute, gradually narrowed into a petiole longer than the blade, coriaceous, uniformly silky on both surfaces; cauline few, distant, ¼–⅓ in. long, linear-oblong or lanceolate. Racemes slender, many-flowered, naked. Flowers rather large, ⅓ in. long or more, bright sulphur-yellow; pedicels very short. Calyx small, about ⅓ the length of the corolla, clothed with appressed silky hairs; lobes linear, acute. Corolla broadly funnel-shaped or almost campanulate, tube short, broad above, with 5 scales in the throat; limb large, with rounded lobes. Stamens included, the tips of the anthers reaching the corolla-scales. Style long, almost equalling the corolla. Nutlets ovoid; pale greyish-brown.—*Cheesem. Man. N.Z. Fl.* (1906) 465.

South Island: Otago—Hills near Cromwell, Clutha River, *Hector* and *Buchanan! Petrie!* 800–1500 ft.

A curious and distinct species, only known from one locality, where it is fast becoming exceedingly rare.

16. **M. Goyeni** *Petrie in Trans. N.Z. Inst.* xxiii (1891) 400.—Perennial; everywhere clothed with short rigid appressed white hairs, giving the whole plant a greyish appearance. Rootstock stout, woody; flowering stems one or several, decumbent at the base, ascending or erect at the tips, slender, branched, 4–10 in. long. Radical leaves numerous, tufted, 1½–3 in. long, ¼–⅓ in. broad, linear-spathulate, acute, gradually narrowed into a slender petiole much longer than the blade, coriaceous, uniformly hispid on both surfaces; cauline smaller and on shorter petioles, the upper sessile. Racemes slender, naked, many-flowered. Flowers large, ½–¾ in. long, pale-yellow or white with a yellow centre, almost sessile or on very short pedicels. Calyx small, ⅓ as long as the corolla, deeply 5-lobed; lobes linear-subulate, acute. Corolla broadly funnel-shaped; tube short, broad above, with 5 scales at the throat; limb large, with short rounded lobes. Stamens included, the tips of the anthers reaching the corolla-scales. Style slender, ¾ the length of the corolla. Nutlets ovoid, brownish.—*Cheesem. Man. N.Z. Fl.* (1906) 466.

South Island: Nelson—Mount Percival, Hanmer, *T. F. C.* Canterbury—Broken River, *Cockayne.* Otago—Arrowtown, Cardrona Valley, Lake Hawea, *Petrie!* Queenstown, *Wilcox;* Lake Wanaka, *Cockayne.* 1000–4000 ft. November–January.

Very near to *M. albo-sericea*, but a much larger plant, with longer branched stems, greyish (not silvery-white) pubescence, and larger flowers, which are often quite white.

17. **M. australis** *R. Br. Prodr.* (1810) 495.—An erect densely hispid perennial herb 6–16 in. high; stems usually branched from the base, slender or rather stout, sparingly leafy. Radical leaves ¾–2 in. long, oblong-spathulate or linear-spathulate, obtuse, narrowed into long petioles, rather coriaceous, hispid on both surfaces; cauline distant, smaller and shorter, sessile, linear-oblong or linear-spathulate. Racemes elongated, many-flowered, hispid with spreading straight or hooked hairs. Flowers yellow or white, ⅕–¼ in. long; pedicels very short. Calyx densely hispid with spreading hooked hairs, divided ¾-way down or more; lobes linear-lanceolate, acute. Corolla-tube funnel-shaped, exceeding the calyx; throat with 5 scales; lobes short, rounded. Stamens included; anther-tips about level with the corolla-scales. Style shorter than the calyx or very slightly exceeding it. Nutlets narrow-ovoid, polished and shining, black when fully ripe.—*Hook. f. Fl. Nov. Zel.* i (1853) 201; *Handb. N.Z. Fl.* (1864) 193; *Benth. Fl. Austral.* iv (1869) 405; *Cheesem. Man. N.Z. Fl.* (1906) 462.

var. hylthensis Lamb ch wall Trans : 55 442

Var. **conspicua**.—Flowers larger, ⅓–½ in. long, ¼ in. diam., campanulate. Style considerably longer than the calyx.

North Island: Hawke's Bay — Kaweka Mountain, *Tryon*. South Island: Abundant throughout. Sea-level to 4000 ft. December–February.

Closely allied to *M. Forsteri*, but easily distinguished by the more erect habit, more hispid stems and leaves and calyces, shorter and more erect pedicels, usually yellow flowers, and narrower black nutlets. It is a common Australian plant, but although I have examined a large series of specimens from both countries I can find no differences of importance.

18. **M. Forsteri** *Lehm. Asperif.* (1821) 95.—Usually perennial. Stems branched from the root, decumbent or almost prostrate below, ascending or suberect above, slender, flaccid, leafy, 6–18 in. long, more or less hispid or pilose with soft white hairs. Lower leaves on long slender petioles ½–2 in. long; blade ½–1½ in., oblong or orbicular-oblong, obtuse or apiculate, rather membranous, both surfaces hispidulous. Racemes elongated, very many-flowered; the lower flowers often axillary; fruiting-pedicels equalling the calyx or longer than it, spreading. Flowers about ¼ in. long, white or white with a yellow eye. Calyx campanulate, hispid with spreading hooked hairs, 5-lobed to the middle; lobes linear-oblong, acute. Corolla-tube funnel-shaped, slightly exceeding the calyx, throat with 5 scales; lobes short, rounded. Anthers included, their tips equalling the corolla-scales. Nutlets broadly ovoid or almost orbicular, pale-brown, shining. —*DC. Prodr.* x (1846) 110; *A. Cunn. Precur.* (1838) n. 393; *Raoul Choix* (1846) 43; *Hook. f. Fl. Nov. Zel.* i (1853) 200; *Handb. N.Z. Fl.* (1864) 194; *Cheesem. Man. N.Z. Fl.* (1906) 463; *Ill. N.Z. Fl.* ii (1914) t. 142. M. spathulata *A. Rich. Fl. Nouv. Zel.* (1832) 198 (*non Forst. f.*). M. Hamiltoni *Col. in Trans. N.Z. Inst.* xx (1888) 201. M. polyantha and M. tenuifolia *Col. l.c.* xxxi (1899) 275, 276. (?) M. venosa *Col. l.c.* xxviii (1896) 606.

North and South Islands: Not uncommon from the Bay of Islands to the south-west of Otago. Sea-level to 3500 ft. October–February.

19. **M. spathulata** *Forst. f. Prodr.* (1786) n. 62.—Pilose or hispid in all its parts. Stems usually many from the root, branched, prostrate, ascending at the tips, slender, sparingly leafy, 3–16 in. long. Leaves on long or short petioles; blade ⅓–1 in. long, orbicular or broadly ovate or

obovate, obtuse or apiculate, membranous, hispidulous on both surfaces; cauline smaller and on shorter petioles. Flowers small, $\frac{1}{8}$ in. long, white with a yellow eye, solitary, axillary or springing from the branches near the leaves. Calyx hispid with long straight hairs, cut $\frac{3}{4}$-way down; lobes linear-lanceolate, acute. Corolla funnel-shaped; tube short, hardly exceeding the calyx, throat naked or furnished with 5 scales, limb equalling the tube or slightly longer than it. Stamens inserted on the corolla-tube; filaments longer than the anthers, sometimes elongated; anthers altogether above the level of the scales and frequently reaching $\frac{3}{4}$-way up the corolla-lobes. Nutlets ovoid, pale-brown, smooth and shining, much compressed, margins thin.—*DC. Prodr.* x (1846) 112; *Hook. f. Fl. Nov. Zel.* i (1853) 201; *Handb. N.Z. Fl.* (1864) 193; *Cheesem. Man. N.Z. Fl.* (1906) 466. Anchusa spathulata *R. Br. ex Roem. and Schult. Syst.* iv (1819) 100; *A. Cunn. Precur.* (1838) n. 392; *Raoul Choix* (1846) 43.

North and South Islands, Chatham Islands, Stewart Island: From the Three Kings Islands southwards in moist lowland stations, but not common.

A very variable plant. Small states sometimes have the throat of the corolla either without scales or with very obscure ones. This character was used by De Candolle to constitute his subgenus *Gymnomyosotis*, but there is a gradual transition from flowers without scales to others in which they are as well developed as in other species of the genus, and looking at the fact that the filaments are at least longer than the anthers it seems best to place the species in the subgenus *Exarrhena*, and in the neighbourhood of *M. petiolata*.

20. **M. petiolata** *Hook. f. Fl. Nov. Zel.* i (1853) 202.—Perennial; sparsely clothed with short white scabrid hairs; rootstock long, stout or slender; stems usually numerous, decumbent or prostrate at the base, then ascending, slender, sparingly leafy, 6–14 in. long. Radical and lower cauline leaves on long slender petioles $\frac{1}{2}$–3 in. long; blade $\frac{2}{3}$–2 in., broadly elliptic-oblong or elliptic-obovate, apiculate or rounded or retuse at the tip, thin and membranous, both surfaces slightly scabrid; upper cauline sessile, broadly obovate-spathulate. Racemes long, slender, many-flowered, simple or forked. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. diam., white or white with a yellow eye; pedicels rather long, slender, spreading. Calyx clothed with straight appressed hairs, 5-lobed almost to the base; lobes linear, acute. Corolla broad, campanulate; tube very short, with 5 scales at the throat; limb several times longer than the tube, deeply 5-lobed; lobes oblong, spreading. Stamens with long and slender filaments; anthers far exserted beyond the tube, almost reaching the top of the corolla-lobes. Nutlets broadly ovoid, polished and shining, dark red-brown or black.—*Cheesem. Man. N.Z. Fl.* (1906) 467. M. diversifolia *Petrie in Trans. N.Z. Inst.* l (1918) 208. Exarrhena petiolata *Hook. f. Handb. N.Z. Fl.* (1864) 467.

North Island: Cliffs north of the Manukau Harbour, *T. F. C.*; East Cape, *Bishop Williams!* Hawke's Bay and Cape Turnagain, *Colenso!* Patangata, *Tryon*; Ruahine Mountains, *H. Hill!* South Island: Mount Arthur Plateau, *T. F. C.*; Cobb Valley, *F. G. Gibbs!* Sea-level to 3000 ft. November–January.

The typical state of this handsome plant is generally found on wooded coastal cliffs. Mr. Petrie (Trans. N.Z. Inst. l (1918) p. 209) confines the species to such, remarking that "the montane plants referred to it probably belong elsewhere." But specimens gathered by myself on the Mount Arthur Plateau, Nelson, differ in no respect except the slightly smaller size. In the mode of growth, shape of the leaves, and in the structure of the flowers and their colour, there is almost complete correspondence. Of Mr. Petrie's *M. diversifolia* I have only seen a single specimen, which I hesitate to separate without fuller material. It may be the same as my *M. Astoni*, which is very near to *M. petiolata*.

21. **M. Astoni** *Cheesem. in Trans. N.Z. Inst.* xlii (1910) 217.—Perennial; sparingly clothed with short soft hairs. Flowering stems several from the root, slender, decumbent below, erect or ascending above, 6–12 in. long. Radical leaves few or many, 2–4 in. long; blade about $\frac{1}{2}$ the length, $\frac{1}{2}$–$\frac{3}{4}$ in. broad, linear-obovate to oblong-obovate or oblong-spathulate, obtuse or subacute, thin and membranous, both surfaces sparsely clothed with soft white hairs; cauline much smaller, oblong or linear-oblong, sessile, or the lower alone shortly petiolate. Racemes pedunculate, simple or forked, many-flowered. Calyx hispid with soft white hairs; lobes erect, linear-oblong, subacute. Corolla funnel-shaped; tube equalling the calyx, throat with 5 scales; limb rather small. Stamens inserted just below the corolla-scales; filaments long, more than twice the length of the anthers, which reach more than half-way up the corolla-lobes. Nutlets ovoid, smooth and shining, dark-brown.

North Island: Mount Holdsworth, Tararua Mountains, altitude 4000–4500 ft., *W. Townson! B. C. Aston!*

Perhaps too close to *M. petiolata*, from which it chiefly differs in the smaller size, more softly hairy stems and leaves, more numerous cauline leaves, and in the fewer smaller flowers.

22. **M. Townsoni** *Cheesem. Man. N.Z. Fl.* (1906) 1145.—Perennial; more or less densely hispid with soft spreading white hairs; rootstock rather long, prostrate, branched; stems few or many, 3–6 in. high, slender, leafy, prostrate or decumbent below, ascending or erect at the tips. Radical leaves on long slender petioles $\frac{1}{3}$–$\frac{2}{3}$ in. long; blade $\frac{1}{2}$–1 in. by $\frac{1}{4}$–$\frac{1}{3}$ in., oblong-spathulate or linear-oblong, obtuse or apiculate, membranous, upper surface densely hispid with soft white hairs, often almost glabrous beneath. Cauline leaves numerous, narrow-oblong, sessile or the lowermost petiolate. Flowers in the axils of the upper cauline leaves or forming few-flowered racemes terminating the stem, $\frac{1}{4}$–$\frac{1}{3}$ in. long, $\frac{1}{5}$–$\frac{1}{4}$ in. diam., sessile or the lowermost shortly pedicelled. Calyx hispid with coarse white hairs, 5-lobed below the middle; lobes linear-lanceolate, acute. Corolla-tube cylindric, much longer than the calyx; throat with 5 scales; limb broad, flat, with broadly oblong lobes. Stamens inserted between the corolla-scales; filaments slightly longer than the linear anthers, which are wholly above the level of the scales. Nutlets ovoid, shining, black.

South Island: Nelson—Brunner Range and Lyell Mountains, *W. Townson!* 3000–4500 ft. January–March.

In the structure of the flower this is intermediate between *Exarrhena* and *Eumyosotis;* but as the anthers stand above the level of the corolla-scales I have placed it in the former section. It is apparently allied to *M. saxosa* and *M. Lyallii*, but differs from both in the flowers being chiefly axillary.

23. **M. laeta** *Cheesem. in Trans. N.Z. Inst.* xvii (1885) 236.—Perennial; sparingly clothed with short white hispid hairs. Flowering stems one or few from the root, slender, erect, sparingly leafy, 6–12 in. high. Radical leaves 1–3 in. long, rarely more, oblong-spathulate or narrow obovate-spathulate, obtuse or acute, gradually narrowed into rather long petioles, membranous, both surfaces sparingly hispid; cauline few, linear-oblong or lanceolate, sessile, acute. Racemes elongate, simple, many-flowered; pedicels slender. Flowers $\frac{1}{3}$–$\frac{1}{2}$ in. long, yellow or white with a yellow eye. Calyx hispid with straight or hooked white hairs, 5-partite $\frac{3}{4}$-way down; lobes linear, acute. Corolla campanulate; tube short, throat with 5 scales; limb large, with 5 short rounded lobes. Stamens with long slender

filaments; anthers reaching almost to the top of the corolla-lobes. Style exserted. Nutlets ovoid, pale-brown.—*Man. N.Z. Fl.* (1906) 468.

North Island: Hawke's Bay, *Tryon!* South Island: Nelson—Mountains flanking the Wairau Valley, *T. F. C.;* Lake Tennyson, *R. M. Laing.* Canterbury—Ashburton Mountains, *Potts!* 1500–4000 ft. December–February.

In the shape of the corolla this much resembles *M. Goyeni;* but the anthers are on long slender filaments, and are exserted far beyond the corolla-tube, almost reaching the top of the lobes.

24. **M. Laingii** *Cheesem. in Trans. N.Z. Inst.* xliv (1912) 161.—Perennial; everywhere clothed with copious soft white hairs. Flowering stems several from the root, slender, decumbent below, erect above, 12–18 in. high. Radical leaves numerous, 3–6 in. long; blade about $\frac{1}{2}$ the length, linear- or lanceolate-spathulate, obtuse or subacute, gradually narrowed into the very long and slender petiole, membranous, both surfaces clothed with soft white hairs, midrib distinct. Cauline leaves much smaller, the lower shortly petioled, the upper sessile. Racemes many-flowered, usually simple, rarely forked. Flowers large, crowded, $\frac{1}{2}$–$\frac{3}{4}$ in. long, yellow, shortly pedicelled. Calyx long and narrow, 5-partite; lobes linear, acute. Corolla narrow-campanulate; tube about $\frac{1}{2}$ the length; throat with 5 emarginate scales; limb large, deeply lobed, the lobes oblong, obtuse. Stamens with slender elongated filaments, which are inserted just below the scales; anthers large, narrow-linear, reaching half-way up the corolla-lobes. Ripe nutlets not seen.

South Island: Marlborough—Kaikoura Mountains, *Buchanan!* Nelson—Wairau Gorge *T. F. C.;* Lake Tennyson, *R. M. Laing!* Altitudinal range from 2500 to 4500 ft.

Evidently closely allied to my *M. laeta,* but differing in the much taller stems and much larger flowers.

25. **M. amabilis** *Cheesem. Man. N.Z. Fl.* (1906) 408.—Perennial; everywhere densely clothed with soft white hairs; rootstock stout; flowering stems usually several, rather stout, decumbent at the base, erect above, leafy, 3–9 in. high. Radical leaves numerous, 1–2$\frac{1}{2}$ in. long, linear-obovate or obovate-spathulate, obtuse, narrowed into rather long broad petioles, coriaceous, equally hoary on both surfaces with short soft white hairs; cauline smaller, sessile, oblong-lanceolate or linear-oblong, acute. Racemes pedunculate, simple or forked, at first short and capitate, but lengthening as the flowering advances, many-flowered. Flowers large, white, $\frac{1}{2}$–$\frac{2}{3}$ in. long, $\frac{1}{2}$ in. diam., very shortly pedicelled. Calyx $\frac{1}{3}$ in. long, densely hispid with soft white hairs, lobed about $\frac{2}{3}$-way down; lobes lanceolate, acute. Corolla large, campanulate or broadly funnel-shaped; tube exceeding the calyx, with 5 rather narrow scales at the mouth; limb large, with 5 rounded veined lobes. Stamens attached above the level of the scales; filaments nearly twice the length of the anthers, which reach more than half-way up the corolla-lobes. Ripe fruit not seen.

North Island: Auckland—Summit of Mount Hikurangi, East Cape district, altitude 5000 ft., *Petrie* and *Adams!* January.

Evidently a very handsome plant. In habit and foliage it much resembles my *M. explanata,* but is smaller and stouter, with more copious hairs, and the flowers are altogether different in structure. Mr. Brown, who has compared specimens with the types at Kew, remarks that "it differs from the type of *M. saxosa* in its larger habit, larger leaves (which are nearly 2 diameters larger than those of *M. saxosa* and have a different under-surface), and the calyx is also narrower and less erect. It is more like *M. Lyallii,* but the flowers are more numerous and denser, and the leaves are hairy all over beneath, whilst in *M. Lyallii* it is only on the midrib that they are hairy beneath."

26. **M. eximia** *Petrie in Trans. N.Z. Inst.* xlviii (1916) 188.—Perennial; everywhere sparingly clothed with closely appressed stiff white hairs. Rhizome branched, often prostrate and rooting and forming extensive patches of considerable size. Flowering stems numerous, slender, simple or branched, erect or decumbent at the base, leafy below, naked above. Radical leaves many, narrow oblong-spathulate or oblanceolate, 1¼—2¼ in. long, acute or subacute, gradually narrowed into a flattened petiole, appressed-pilose on both surfaces, but somewhat less so beneath, midrib slightly evident. Cauline leaves shorter and narrower and more acute, the upper sessile. Racemes long pedunculate, simple or rarely forked. Flowers 5–12, large, white with a yellow eye, ⅝–¾ in. diam., shortly pedicelled. Calyx cut down for nearly ¾ into narrow linear-subulate lobes. Corolla large, campanulate or broadly funnel-shaped; tube broad, equalling or exceeding the calyx; limb large, with 5 rounded lobes. Stamens attached above the level of the corolla-scales; filaments twice the length of the anthers, which reach more than half-way up the corolla-lobes. Ripe fruit not seen.

North Island: Ruahine Mountains, limestone bluffs and talus slopes on Mount Aorangi, Mangohane, *B. C. Aston!* Altitude 3900 ft. December–January.

Very closely allied to my *M. amabilis*, from which it only differs in its more slender habit, narrower and thinner and more acute leaves, and slightly larger flowers. The structure of the flowers is very similar in both plants.

27. **M. saxosa** *Hook. f. Fl. Nov. Zel.* i (1853) 202.—Perennial; small, stout, leafy, very densely hispid with rather long soft white hairs. Flowering stems decumbent at the base, ascending above, 2–3 in. high. Leaves ½–¾ in. long, linear-spathulate, subacute or apiculate, on broad petioles. Racemes pedunculate, few-flowered; flowers crowded, shortly pedicellate. Calyx nearly ¼ in. long, deeply 5-partite; lobes linear. Corolla funnel-shaped; throat with 5 scales. Anthers slightly exserted.—Exarrhena saxosa *Hook. f. Handb. N.Z. Fl.* (1864) 196 (so far as the North Island specimens are concerned). E. Colensoi *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 351 (*in part*).

North Island: Hawke's Bay—Crags at Titiokura, *Colenso! B. C. Aston!*

The above description is based on that given by Hooker in the Flora. I have referred to the same species, for the present, a plant collected in the original locality by Mr. B. C. Aston; but as no flowering specimens were obtained, and as the leaves do not altogether correspond with a fragment from the type given to me by Sir J. D. Hooker, there is an element of doubt in the identification. It is quite possible that Petrie's *M. eximia* may be the same.

28. **M. Lyallii** *Hook. f. Fl. Nov. Zel.* i (1853) 202.—"A rather short and stout tufted perennial, slightly hispid with appressed hairs. Stems several from the root, erect or ascending, rather stout, 2–6 in. high. Leaves: Radical oblong-spathulate or obovate-lanceolate, subacute, 1–1½ in. long, narrowed into rather slender petioles; cauline narrow linear-oblong or oblong-spathulate, all slightly hispidulous on both surfaces with appressed hairs. Racemes short, simple or forked. Flowers very shortly pedicelled. Calyx ¼ in. long, hispid with appressed or patent, simple and hooked bristles. Corolla ⅙–¼ in. long; tube cylindric, longer than the calyx; lobes short, rounded. Stamens with long slender filaments; anthers linear. Nuts broadly ovate or orbicular, very black and shining."—*Cheesem. Man. N.Z. Fl.* (1906) 470. Exarrhena Lyallii *Hook. f. Handb. N.Z. Fl.* (1864) 196.

South Island: Otago—Milford Sound, *Lyall;* shingle-slopes on Mount Burns, alt. 5000 ft., *Crosby Smith* and *Cuthbert!*

I have only seen three very indifferent specimens of this, kindly lent to me by Mr. Petrie. Although they probably correspond with Hooker's plant, I have thought it best to reproduce his description herewith.

29. **M. Monroi** *Cheesem. Man. N.Z. Fl.* (1906) 469.—Perennial; more or less hispid with short stiff white hairs. Flowering stems several from the root, slender, decumbent below, erect or ascending above, 2–6 in. high. Radical leaves numerous, $\frac{3}{4}$–2 in. long, narrow obovate-spathulate or lanceolate-spathulate, obtuse or subacute, narrowed into a rather long slender petiole, hispid with short stiff white hairs on the upper surface, more sparingly so beneath and sometimes glabrous except the midrib; cauline smaller and narrower, lanceolate or linear-lanceolate, acute, sessile. Racemes pedunculate, simple or forked, many-flowered. Flowers yellow, $\frac{1}{4}$–$\frac{1}{3}$ in. long, shortly pedicelled. Calyx hispid with stiff white hairs, deeply lobed; lobes erect, linear, acute. Corolla funnel-shaped; tube cylindric, rather longer than the calyx, throat with 5 scales; limb spreading, shortly lobed; lobes broad, rounded. Stamens inserted between the corolla-scales; filaments twice the length of the anthers, which usually overtop the corolla-lobes. Ripe fruit not seen.—*Ill. N.Z. Fl.* ii (1914) t. 144.

South Island: Nelson—Dun Mountain, *Monro, W. T. L. Travers! Buchanan! Kingsley! T. F. C.;* Red Hills (Wairau Valley), *T. F. C.* 3000–4500 ft. December–February.

In the Handbook this was confused with *M. saxosa.* I have long been convinced of its distinctness; and Mr. N. E. Brown, who has kindly compared my specimens with the type of *M. saxosa,* informs me that the two are in reality very different.

30. **M. concinna** *Cheesem. in Trans. N.Z. Inst.* xvii (1885) 235.—Perennial; everywhere clothed with fine closely appressed soft silky hairs; rootstock rather long, stout. Flowering stems numerous, rather slender, ascending or erect, leafy, 6–14 in. high. Radical leaves numerous, 2–4 in. long, linear- or lanceolate-spathulate to narrow oblong-spathulate, acute or obtuse, gradually narrowed into long rather slender petioles, both surfaces uniformly clothed with soft silky appressed hairs, midrib usually distinct; cauline oblong-lanceolate or linear-oblong, sessile, acute. Racemes many-flowered, simple or forked, at first short and almost capitate, but elongating as the flowering advances. Flowers large, crowded, $\frac{1}{2}$–$\frac{2}{3}$ in. long, bright pale-yellow or more rarely white with a yellow eye, sweet-scented, pedicellate. Calyx covered with appressed silky hairs, 5-partite; lobes linear-lanceolate, obtuse. Corolla broadly funnel-shaped; tube short, hardly exceeding the calyx, throat with 5 scales; limb large, rather longer than the tube, deeply lobed; lobes oblong-ovate, obtuse or acute. Stamens with very slender elongated filaments; anthers exserted beyond the corolla-lobes. Nutlets ovoid, red-brown, but not seen quite ripe.—*Man. N.Z. Fl.* (1906) 470; *Ill. N.Z. Fl.* ii (1914) t. 145.

South Island: Nelson—Limestone rocks on Mount Owen, Mount Arthur, *T. F. C.* 3500–4500 ft. January.

Habit of *M. macrantha,* but at once distinguished by the more silky indumentum, colour of the flowers, and particularly by the shape of the corolla, which has a short tube and large deeply divided limb, whereas in *M. macrantha* the tube is very long and the divisions of the limb comparatively shallow. The filaments are also much longer than in *M. macrantha.*

31. **M. macrantha** *Hook. f. and Benth. Gen. Plant.* ii (1876) 859.—Perennial; more or less densely clothed with soft spreading or appressed hairs; rootstock stout; flowering stems numerous, ascending, rather stout, leafy, 6–14 in. high. Radical leaves 2–6 in. long, lanceolate-spathulate or oblong-lanceolate, obtuse or subacute, narrowed into rather long broad petioles, both surfaces clothed with rather soft appressed hairs; cauline linear-oblong, sessile or the lower alone shortly petioled. Racemes many-flowered, simple or branched, short in the flowering stage but elongating in fruit, densely softly hispid. Flowers large, crowded, $\frac{2}{3}$–1 in. long, brownish-orange, deliciously sweet-scented; pedicels very short. Calyx hispid with straight or hooked hairs, 5-lobed $\frac{3}{4}$-way down; lobes linear, obtuse or subacute. Corolla funnel-shaped: tube long and slender, twice the length of the calyx, throat with 5 scales; limb with 5 oblong obtuse lobes. Stamens with filaments as long as or rather longer than the anthers; anthers wholly above the level of the scales. Style slender, longer than the corolla. Nutlets linear-oblong, shining, black.—*Cheesem. Man. N.Z. Fl.* (1906) 471. Exarrhena macrantha *Hook. f. Handb. N.Z. Fl.* (1864) 195.

Var. **pulchra.**—Similar in size and habit, but more diffuse and less hispid. Leaves thinner and more membranous, sometimes almost glabrous beneath. Corolla $\frac{2}{3}$–$\frac{3}{4}$ in. long; tube much broader, almost campanulate, scales wanting in all the flowers examined. Filaments shorter than the anthers; anthers just reaching the sinus between the corolla-lobes.

Var. **westlandica** *Petrie in Trans. N.Z. Inst.* 1 (1918) 210.—Radical leaves longer and much thinner, softly pilose. Flowering stems longer and more slender. Flowers yellow.

South Island: Subalpine localities from Nelson to the south-west of Otago; not uncommon, especially in the central and western portions of the Southern Alps. 2000–5000 ft. December–February. Var. *westlandica:* Rangitaipo, Teremakau Valley, Westland, *Cockayne! Petrie!*

A remarkably handsome plant. The filaments are never much longer than the anthers, and in var. *pulchra* are nearly as short as in the typical species of *Myosotis*, but as they are inserted high up the tube the anthers reach well up the corolla-limb.

2. MYOSOTIDIUM Hook. 1859.

A stout succulent herb, 1–3 ft. high. Radical leaves large, broadly ovate-cordate or almost reniform; cauline sessile. Flowers blue, in dense corymbose cymes. Calyx deeply 5-partite. Corolla-tube short, throat with 5 protuberances; limb subrotate; lobes 5, spreading, obtuse, imbricate. Stamens 5, affixed to the tube of the corolla; filaments very short; anthers included. Ovary 4-lobed; style very short, thick; stigma capitate. Fruit large, thick and spongy, pyramidal, 4-angled, composed of 4 coriaceous winged nutlets adhering to a central column.

A very remarkable monotypic genus confined to the Chatham Islands.

1. **M. nobile** *Hook. Bot. Mag.* (1859) t. 5137.—Perennial, stout, pilose; rootstock long, thick, cylindrical. Radical leaves crowded, 6–12 in. long, broadly ovate-cordate or reniform, petioled, very thick and fleshy, bright-green and glabrous, strongly nerved; cauline few, broadly ovate or oblong, sessile. Cymes dense, subglobose, 3–6 in. diam., many-flowered. Flowers $\frac{1}{2}$ in. diam., dark-blue in the centre, fading towards the outside, scentless; pedicels $\frac{1}{4}$–$\frac{1}{2}$ in. long. Calyx-lobes broadly oblong, obtuse, more or less hispid with short appressed hairs. Corolla rotate;

M. hortensia (Decne.) Baill. 1891 (Baill Hist. Pl. X 1891: 385)
see Planchon 1846. 45 H. 78.
" " Decn. in Deless. Icon. Select. V. 1846 42. t99.

tube short; limb spreading, lobes rounded. Fruit $\frac{1}{2}$–$\frac{3}{4}$ in. diam.—*Hook. f. Handb. N.Z. Fl.* (1864) 196; *F. Muell. Veg. Chath. Is.* (1864) 32; *Buch. in Trans. N.Z. Inst.* vii (1875) t. 12. *Cheesem. Man. N.Z. Fl.* (1906) 472; *Ill. N.Z. Fl.* ii (1914) t. 146. Cynoglossum nobile *Hook. f. in Gard. Chron.* (1858) 240.

CHATHAM ISLANDS: Sandy soil near the sea, *H. H. Travers! J. D. Enys! Chatham Islands Lily.*

A noble plant, once very abundant on the coast-line of the Chatham Islands, but now fast becoming rare in a wild state.

TETRACHONDRACEAE Skottsg.

3. **TETRACHONDRA** Petrie.

Small, creeping, densely matted perennial herb, glabrous or nearly so. Leaves small, all opposite, elliptic-oblong, obtuse, quite entire; petioles broad, connate at the base. Flowers terminating short axillary branchlets, minute, solitary, tetramerous. Calyx persistent, deeply 4-fid; segments ovate, obtuse. Corolla slightly longer than the calyx, subrotate; tube very short, naked; limb with 4 ovate lobes imbricate in the bud. Stamens 4, inserted at the base of the sinus between the corolla-lobes; filaments as long or rather longer than the anthers; anthers 2-celled, small, rounded, dorsifixed. Ovary 4-partite to the base; style erect from between the lobes, twice as long as the ovary; stigma small. Nutlets 4, attached by a small base, rounded at the back and top, setulose, longer than the persistent calyx and style. Seed erect, albuminous; embryo cylindrical, almost as long as the albumen; cotyledons equalling the radicle.

A genus of two species, one found in New Zealand, the other (*T. patagonica* Skottsberg) found in alpine Patagonia.

Skotts. 1912 Tet. patagonica n-sp.

(T.K. ex. Hosthem.)

1. **T. Hamiltoni** *Petrie ex Oliver in Hook. Ic. Pl.* (1892) t. 2250.—Forming densely matted patches several inches in diameter. Leaves $\frac{1}{2}$–$\frac{1}{10}$ in. long, rather fleshy, obscurely dotted. Flowers minute, $\frac{1}{12}$ in. diam.—*Trans. N.Z. Inst.* xxv (1893) 269; *Cheesem. Man. N.Z. Fl.* (1906) 472. Tillaea Hamiltoni *T. Kirk ex W. S. Hamilton in Trans. N.Z. Inst.* xvii (1885) 292.

See Icon. Pl. Hooks. 23 III (2) Sept. 1892.

SOUTH ISLAND: Lowlands in the south and east. Between the Lee Stream and Taieri; Hindon; Waipahi; Invercargill, *Petrie!* Makarewa River, *W. S. Hamilton!* Sea-level to 1800 ft.

A remarkable little plant, the systematic position of which is very doubtful. It was originally placed in *Tillaea* by Kirk, and no doubt there is considerable outward similarity with that genus, although it differs fundamentally in the gamopetalous corolla, the 4-lobed ovary, and the simple imbedded style. Prof. Oliver, no doubt influenced by the 4-lobed ovary, transferred it to the *Boraginaceae*, although he points out ("Icones Plantarum," t. 2250) that it departs from the characters of the family in the opposite leaves connate at the base, and in the albuminous seeds. Dr. Hans Hallier, in an interesting paper printed in the "Berichten der Deutschen Botanischen Gesellschaft" for 1902, suggests that it should be considered an anomalous member of the *Scrophularineae*, and that its nearest ally is the section *Pygmea* of *Veronica*. A further important contribution to the literature of the subject is given by Skottsberg in a memoir entitled "The Systematic Position of *Tetrachondra*" (Engl. Bot. Jahrb. xlviii (1912) Beib. 17). He altogether repudiates Hallier's views, and after reviewing the whole of the evidence comes to the conclusion that *Tetrachondra* must find a place in the vicinity of the *Labiatae*, quite possibly as an independent family. Later on ("Plant World," May, 1915) he founds the family *Tetrachondraceae* for its reception.

Family XC. **VERBENACEAE.**

Herbs or shrubs or trees. Leaves opposite or whorled, very rarely alternate, usually simple (digitate in *Vitex*); stipules wanting. Flowers generally hermaphrodite, irregular or rarely regular. Calyx inferior, persistent, 4–5-toothed. Corolla gamopetalous, hypogynous; limb 2-lipped or equal, 4–5-lobed, lobes imbricate. Stamens usually 4, didynamous, inserted on the tube of the corolla; anthers 2-celled, dehiscing lengthwise. Ovary superior, entire or shortly 4-lobed, 2–4-celled; style terminal, simple; stigma entire or 2-lobed; ovules solitary or 2 collateral in each cell, erect or ascending. Fruit drupaceous or almost capsular, 2–4-celled (1-celled in *Avicennia*), indehiscent or the whole fruit or the endocarp alone separating into 2–4 pyrenes. Seeds solitary in each cell, usually erect or ascending; albumen present or wanting; embryo straight, radicle inferior.

A moderately large family, most abundant in the tropics or warm temperate regions of both hemispheres; a few species extend both north and south into cool climates. Genera 70 or thereabouts; species estimated at 750. Bitter or astringent properties predominate in the family, but these can hardly be said to be of medicinal importance. The teak (*Tectona grandis*), the timber of which is so largely employed for shipbuilding, is the species of most economic importance. The genera *Verbena*, *Lantana*, and *Clerodendron* contain several well-known garden-plants. Of the New Zealand genera, *Teucridium* is endemic; *Vitex* is found in nearly all warm countries; while *Avicennia* is widely spread on most tropical shores.

Tree. Leaves digitate. Corolla 2-lipped. Fruit a fleshy drupe..	1. VITEX.
Slender shrub. Leaves small, entire. Corolla 2-lipped. Fruit separating into 4 pyrenes	2. TEUCRIDIUM.
Maritime shrub. Leaves entire. Corolla regular. Fruit capsular	3. AVICENNIA.

Avicenniaceae?

1. **VITEX** Linn. 1735.

Trees or shrubs. Leaves opposite, digitately 3–5-foliolate, very rarely simple. Flowers in axillary or terminal cymes or panicles. Calyx 5-toothed or -lobed. Corolla-tube short; limb oblique, 2-lipped; lobes 5, the lowest one usually larger than the rest. Stamens 4, didynamous, usually exserted; anther-cells distinct. Ovary 2–4-celled; ovules solitary or 2 in each cell; style filiform, shortly 2-lobed. Drupe globose or obovoid, more or less succulent; endocarp bony, usually 4-celled. Seeds obovate or oblong, albumen wanting.

A large genus of about 70 species, scattered through most tropical and subtropical regions, rare or absent in temperate climates. The New Zealand species is endemic.

1. **V. lucens** *T. Kirk in Trans. N.Z. Inst.* xxix (1897) 525. — A large handsome tree 40–60 ft. high, with a massive trunk 2–5 ft. diam., and a large crown of spreading branches; branchlets tetragonous, glabrous. Leaves on long stout petioles 3–5 in. long; leaflets 3–5, shortly petioled, 2–5 in. long, elliptic-oblong or obovate, abruptly acute or almost acuminate, entire, quite glabrous, dark-green and glossy. Flowers abundantly produced, dull-red, about 1 in. long, arranged in 4–15-flowered dichotomously branched axillary panicles. Calyx short, cup-shaped, truncate or obscurely 5-toothed. Corolla pubescent, 2-lipped; upper lip arched, entire or bifid; lower lip deflexed, 3-lobed. Drupe subglobose, bright-red, $\frac{2}{3}$–$\frac{3}{4}$ in. diam.; endocarp

bony, 4-celled; seeds seldom more than 1 or 2.—*Cheesem. Man. N.Z. Fl.* (1906) 565; *Ill. N.Z. Fl.* ii (1914) t. 161. V. littoralis *A. Cunn. Precur.* (1838) n. 390 (*not of Decaisne*); *Raoul Choix* (1846) 44; *Hook. Ic. Plant.* (1842) tt. 419, 420; *Hook. f. Fl. Nov. Zel.* i (1853) 203; *Handb. N.Z. Fl.* (1864) 223; *T. Kirk Forest Fl.* (1889) t. 105.

North Island: Abundant from the North Cape to the Waikato and Upper Thames, then sparingly southwards to Mahia Peninsula and Cape Egmont. Sea-level to 2500 ft. *Puriri; Kauere.* June–October.

A well-known tree, producing the most valuable hardwood in the Dominion, extensively used for all purposes requiring great strength and durability, as railway-sleepers, the framework of bridges, piles, house-blocks, &c. Also greatly employed for furniture and cabinetwork, and quite equal in figure and general appearance to the best Italian or American walnut.

2. **TEUCRIDIUM** Hook. f. 1854

A much-branched shrub; branchlets slender, 4-angled. Leaves small, opposite, petiolate, entire. Flowers axillary, solitary. Calyx broadly campanulate, 5-lobed; lobes acute. Corolla-tube short; limb oblique, spreading, 2-lipped, 5-lobed; the lower lobe the largest. Stamens 4, didynamous, attached to the base of the corolla-tube, far-exserted; anthers 1-celled. Ovary villous at the tip, 4-lobed, imperfectly 4-celled; ovules 1 in each cell, pendulous; style slender, arcuate, 2-fid; branches subulate, shortly stigmatose. Fruit small, sunk in the persistent calyx, 4-lobed to the middle, ultimately splitting into 4 hispid pyrenes. Seed solitary in each pyrene, laterally affixed; albumen wanting; cotyledons large.

A peculiar monotypic genus confined to New Zealand. Although allied to *Vitex*, it has the anomalous character of a 4-lobed ovary, thus showing an approach to the *Labiatae*.

1. **T. parvifolium** *Hook. f. Fl. Nov. Zel.* i (1853) 203, t. 49.—An erect much-branched shrub 2–5 ft. high; branches slender, twiggy, more or less pubescent. Leaves rather distant, petiolate; blade $\frac{1}{6}$–$\frac{1}{2}$ in. long, ovate or orbicular-ovate or ovate-spathulate, obtuse, membranous; petioles short, equalling the blade. Flowers about $\frac{1}{3}$ in. long; peduncles short, 2-bracteolate. Calyx-lobes subulate. Corolla bluish, hairy. Fruiting-calyx $\frac{1}{6}$ in. diam.—*Handb. N.Z. Fl.* (1864) 224; *Cheesem. Man. N.Z. Fl.* (1906) 566. See Trans 57: 1926: 59. & 71 (1941)

Var. **luxurians** *Cheesem. n. var.*—Leaves larger, the blades sometimes more than $\frac{1}{2}$ in. long. Flowers frequently (but not invariably) in 2–3-flowered cymes. River-flats by the Mangles River, Buller Valley, *H. H. Allan!* Ephamore.

North and South Islands: Auckland—Whangaroa, *Buchanan;* Te Aroha, *Adams! T. F. C.;* Taumaranui, *B. C. Aston!* Hawke's Bay—Kereru, *T. Kirk!* Wellington—Wairarapa Valley, *Colenso, Buchanan!* Nelson—Foxhill, *Bidwill, T. F. C.;* Wairoa, *T. Kirk!* Marlborough—Lower Awatere, *Cockayne.* Canterbury—Akaroa, *Raoul;* Banks Peninsula, *J. F. Armstrong* and others. Canterbury Plains, *W. T. L. Travers.* Otago—Vicinity of Dunedin, *Buchanan! Petrie! T. Kirk!* and others; Otepopo, Bendigo, Queensberry, Balclutha, *Petrie!* Usually in lowland districts, not common. October–January.

3. **AVICENNIA** Linn. 1735

Littoral shrubs or small trees. Leaves opposite, quite entire, coriaceous. Flowers in contracted pedunculate cymes in the axils of the upper leaves or in trichotomous corymbs at the ends of the branches. Calyx short, 5-partite, unchanged in fruit. Corolla-tube short and broad; limb of 4 or

Acc. to Bakhuizen: resembles ours in Aust. N.Z. N.C. N. Guinea, Moluccas, Philippines, Galapagos.

A. marina (Forsk.) Vierh. var resinifera (Forst.) Bakh.
Bull. Jard. Bot. Buit. III (III)

5 nearly equal spreading lobes. Stamens 4, inserted on the throat of the corolla; filaments short; anthers shortly exserted, ovate, cells parallel. Ovary imperfectly 4-celled by a 4-winged central column; ovules 4, pendulous between the wings of the column; style usually short, bifid. Capsule broad, compressed, coriaceous, 1-celled, 2-valved. Seed solitary, erect, consisting of a large embryo with the usual integuments very feebly developed; cotyledons large, folded longitudinally; radicle inferior, villous; plumule conspicuous, germinating before the fall of the fruit.

A genus comprising 2 or 3 very closely related species, widely spread along the shores of most tropical or subtropical countries.

1. **A. officinalis** *Linn. Sp. Plant.* (1753) 110. — A shrub or small tree from 3 or 4 ft. to 15 or 25 ft. high or even more; roots putting up a multitude of stout asparagus-like suckers; branches spreading, the younger ones pubescent. Leaves 2–4 in. long, ovate or elliptic-oblong or ovate-lanceolate, usually acute, narrowed into a short petiole, glabrous above and black when dry, hoary with a short dense pubescence beneath. Cymes contracted into small heads on erect angular peduncles. Flowers small, about $\frac{1}{4}$ in. diam. Bracts and calyx-segments densely silky-tomentose. Corolla 4-lobed; lobes coriaceous, ovate, acute, silky externally. Ovary hairy. Capsule large, about 1 in. diam.—*Hook. f. Handb. N.Z. Fl.* (1864) 224; *Benth. Fl. Austral.* v (1870) 69; *T. Kirk Forest Fl.* (1889) t. 130; *Cheesem. Man. N.Z. Fl.* (1906) 566. A. tomentosa *Jacq. Enum. Pl. Carib.* 25; *A. Cunn. Precur.* (1838) n. 389; *Raoul Choix* (1846) 43; *Hook. f. Fl. Nov. Zel.* i (1853) 204. A. resinifera *Forst. f. Pl. Escul.* (1786) 72; *Prodr.* n. 246; *A. Rich. Fl. Nouv. Zel.* (1832) 195.

Forst. (1786) 45 256
Bull. Jard. Bot. III.

North Island: Muddy creeks and estuaries from the North Cape to Opotiki on the East Coast and Kawhia on the west. *Manawa; Mangrove.*

The Chatham Islands locality quoted in the Handbook on the authority of Dieffenbach is certainly erroneous. Probably he mistook flowerless specimens of *Olearia Traversii* for it. Forster's name of *A. resinifera* was applied under the supposition that it produced a gum-resin which was eaten by the Maoris. This mistake doubtless originated through drifted pieces of kauri-gum (which was formerly used by the Maoris as a masticatory) having been picked up on some beach amongst the roots of *Avicennia.*

Family XCI. **LABIATAE.**

Herbs or shrubs, the stems and branches usually quadrangular. Leaves opposite or whorled, frequently replete with glands containing an aromatic volatile oil; stipules wanting. Flowers hermaphrodite, irregular, solitary or in small axillary opposite cymes or clusters which are often aggregated into terminal spikes or racemes. Calyx inferior, persistent, 4–5-toothed or -cleft or 2-lipped. Corolla gamopetalous, hypogynous; limb more or less 2-lipped, rarely equal; lobes 4–5, imbricate. Stamens inserted on the corolla-tube, usually 4 and then often didynamous, sometimes 2 only; anther-cells separate or confluent. Ovary superior, of 2 connate deeply 2-lobed carpels and hence 4-partite, 4-celled; style simple, proceeding from between the lobes of the ovary; stigma usually 2-fid; ovules solitary in each cell, erect, anatropous. Fruit enclosed in the persistent calyx, of 4 1-seeded nutlets. Seeds small, erect; albumen wanting or nearly so; radicle next the hilum.

A very large and exceedingly natural family, quite cosmopolitan in its distribution, but most abundant in the warm-temperate portion of the Northern Hemisphere. Genera nearly 200; species not far from 3000. Most of the species are strongly aromatic, and have stimulating or tonic properties. Some are used as condiments, as thyme, spearmint, sage, marjoram, sweet basil, &c. The essential oils obtained from peppermint, lavender, rosemary, and other species are used medicinally. Many brilliant garden-plants belong to the family, especially of the genus *Salvia*. The meagre representation of the family in New Zealand is one of the chief peculiarities of the Flora. Only 2 genera occur, both of which have a wide distribution in temperate and warm regions. On the other hand, many species of northern origin have become naturalized since the commencement of European settlement, as will be seen on reference to the list of introduced plants given in the appendix.

Calyx 10-nerved. Corolla almost regular, lobes flat. Stamens 4, equal, erect .. .. 1. MENTHA.

Calyx 2-lipped, closing over the fruit. Corolla 2-lipped. Stamens 4, didynamous .. .. 2. SCUTELLARIA.

1. **MENTHA** Linn. 1735

Strong-scented perennial herbs; rootstock creeping, stoloniferous. Leaves opposite. Flowers small, often axillary and solitary in the New Zealand species, but in others frequently arranged in many-flowered whorls or clusters, which are often aggregated into terminal spikes. Calyx campanulate or tubular, 5-toothed, throat naked or villous. Corolla-tube short, not exceeding the calyx; limb 4-lobed; lobes nearly equal or the upper one broader. Stamens 4, equal, erect, distant; filaments glabrous; anther-cells 2, parallel. Style shortly bifid. Nutlets dry, ovoid, smooth, not bordered.

A widely spread genus, most abundant in Europe and northern Asia, where the species are highly variable and difficult of discrimination. The single New Zealand species is found nowhere else. Several of the European species have established themselves as weeds or garden-escapes, especially the pennyroyal (*M. pulegium*), corn-mint (*M. arvensis*), peppermint (*M. piperita*), and spearmint (*M. viridis*). Descriptions of these will be found in any English Flora.

1. **M. Cunninghamii** *Benth. in DC. Prodr.* xii (1848) 174.—A fragrant perennial herb. Rhizome slender, wiry, prostrate, much branched, often matted; stems numerous from the rhizome, diffusely branched, pubescent, 2–12 in. long. Leaves shortly petiolate or nearly sessile, $\frac{1}{6}$–$\frac{1}{2}$ in. long, broadly ovate or almost orbicular, obtuse, entire or with an obscure notch on each side, glandular-dotted. Flowers small, white, axillary, usually solitary but sometimes 2–3 in each axil; peduncles slender, variable in length. Calyx about $\frac{1}{8}$ in. long, tubular-campanulate, densely hairy; teeth villous within. Corolla-lobes almost equal, flat, spreading, upper one shortly bifid. Stamens equalling the corolla or slightly exserted.—*Hook. f. Fl. Nov. Zel.* i (1853) 205; *Handb. N.Z. Fl.* (1864) 225; *Cheesem. Man. N.Z. Fl.* (1906) 568. M. consimilis *Col. in Trans. N.Z. Inst.* xviii (1886) 264. Micromeria Cunninghamii *Benth. Lab. Gen. et Sp.* (1832) 730; *A. Cunn. Precur.* (1838) n. 391; *Raoul Choix* (1846) 43.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND: Abundant throughout, in rather dry open grassy places. Sea-level to 4500 ft.

2. **SCUTELLARIA** Linn. 1735

Annual or perennial herbs or undershrubs. Flowers solitary or in pairs, axillary or in terminal racemes or spikes. Calyx campanulate, 2-lipped; lips entire, closed in fruit, the upper one bearing on its back a broad

concave deciduous scale. Corolla-tube long, dilated above; limb 2-lipped, the upper one concave, entire or emarginate, the lower convex, dilated, 3-lobed. Stamens 4, didynamous; anthers conniving in pairs, ciliate, lower 1-celled, upper 2-celled. Upper lobe of the style very short. Nutlets small, granular-tuberculate or smooth.

A large genus of about 200 species, found in most parts of the world, but most abundant in America. The New Zealand species is endemic, but is closely allied to the Australian *S. humilis* R. Br.

1. **S. novae-zealandiae** *Hook. f. Fl. Nov. Zel.* ii (1855) 335. — Stems slender, creeping and rooting at the base, erect or ascending above, sparingly branched, sparsely pilose or almost glabrous, 5–15 in. high. Leaves in distant pairs, on slender petioles $\frac{1}{4}$–$\frac{3}{4}$ in. long; blade $\frac{1}{6}$–$\frac{1}{2}$ in., from ovate or ovate-oblong to orbicular or reniform, 3–5-lobed or -crenate or quite entire. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. long, white, solitary in the axils of the upper leaves; peduncles usually longer than the calyx, often secund. Calyx short, minutely pubescent; lips obtuse, rounded; scale at first shorter than the upper lip, but becoming much larger in fruit. Corolla pubescent, about twice as long as the calyx; lower lip rather longer than the upper one; lobes obtuse. Anthers glabrous.—*Handb. N.Z. Fl.* (1864) 226; *Cheesem. Man. N.Z. Fl.* (1906) 568. S. humilis *Hook. f. Fl. Nov. Zel.* i (1853) 205 (*not of R. Br.*).

South Island: Nelson—Maitai Valley and other localities near Nelson, *T. F. C.*; Foxhill, *Bidwill, Monro, T. F. C.* Marlborough—Pelorus and Tinline Valleys, *J. H. Macmahon!*

Apparently a rare and local plant. It has been recorded from Banks Peninsula and Flagstaff Hill, near Dunedin, but, I believe, erroneously.

Family XCII. **SOLANACEAE.**

Herbs or shrubs, rarely small trees. Leaves alternate, often in unequally placed pairs, but never truly opposite, entire or lobed or pinnate; stipules wanting. Flowers regular or occasionally slightly irregular, hermaphrodite, solitary or cymose; bracts wanting. Calyx inferior, persistent, 4–5-toothed or -lobed. Corolla gamopetalous, hypogynous, 4–5-toothed or -lobed, campanulate or funnel-shaped or rotate, often plicate. Stamens 4–5, inserted on the tube of the corolla and alternate with its lobes; anthers free or conniving, dehiscing lengthwise or by apical pores. Ovary superior, 2-celled, rarely incompletely 4-celled; style terminal, simple; stigma entire or 2-lobed; ovules numerous, amphitropous, on prominent peltate placentas attached to the middle of the septum. Fruit a berry or capsule, usually 2-celled, many-seeded. Seeds small, compressed or reniform; albumen copious; embryo terete, curved or almost spiral, radicle next the hilum.

A large and widely diffused family, most numerous in the tropics, but extending northwards and southwards into most temperate regions. Genera about 70; species variously estimated, probably considerably over 1500. The family must be considered a dangerous one, from the large number of species containing narcotic and poisonous principles, as the deadly nightshade, henbane, tobacco, stramonium, &c. A few species are simply tonic and bitter, while others are pungent and stimulant, as the various kinds of capsicums. But, notwithstanding the generally suspicious character of the family, it nevertheless furnishes one of the chief articles of vegetable food in the potato, and also includes the tomato, egg-plant, and Cape gooseberry. Among garden-plants the genera *Petunia, Salpiglossis, Cestrum,* and *Datura* are the most noteworthy. The sole New Zealand genus is almost cosmopolitan.

SOLANUM Linn.

Herbs or shrubs or small trees, unarmed or spinous. Leaves alternate, often in pairs, a smaller one being developed in the axil of the larger one, entire or irregularly toothed or divided. Flowers solitary or more frequently in short racemes or cymes, lateral or terminal. Calyx 5–10-lobed or -partite. Corolla rotate or shortly campanulate; tube short; limb 5–10-lobed, plaited. Stamens 5, inserted on the throat of the corolla, exserted; filaments short; anthers oblong or linear, erect and connivent into a cone around the style, opening by 2 terminal pores. Ovary 2-celled, rarely 3–4-celled; style simple; stigma small; ovules numerous. Fruit a small or large 2-celled many-seeded berry. Seeds numerous, discoid or reniform.

An immense genus, abundant in all tropical countries and especially so in tropical America, rarer in temperate regions. Species probably over 1200.

Herbaceous, 1–3 ft. high. Leaves ovate. Flowers small, $\frac{1}{4}$–$\frac{1}{3}$ in. diam. .. .. 1. *S. nigrum.*

Shrubby, 4–8 ft. high. Leaves lanceolate, often pinnatifid. Flowers large, $\frac{3}{4}$ in. diam. .. .. 2. *S. aviculare.*

S. sodomaeum Linn., a spinous species with stellate pubescence, pinnatifid leaves, and rather large globose yellow berries, has become naturalized in many localities between the North Cape and Tauranga. So also has *S. auriculatum* Ait., an unarmed densely woolly species with large leaves furnished with a pair of roundish auricles near the base of the petioles. The common potato (*S. tuberosum* Linn.) often lingers for a time in places where it has been cultivated.

1. **S. nigrum** *Linn. Sp. Plant.* (1753) 186.—Erect, herbaceous from a somewhat woody base, glabrous or pubescent, 1–3 ft. high; branches spreading, angular, the angles sometimes minutely tuberculate. Leaves on slender petioles; blade $1\frac{1}{2}$–3 in. long, ovate or ovate-rhomboid, acute or acuminate, narrowed into the petiole, entire or coarsely and irregularly toothed, membranous. Flowers small, white, drooping, $\frac{1}{3}$ in. diam., in small umbellate 5–8-flowered cymes; peduncles slender, supra-axillary. Calyx 5-lobed to the middle. Corolla deeply 5-lobed. Berry $\frac{1}{4}$–$\frac{1}{3}$ in. diam., globose, black or red.—*Raoul Choix* (1846) 43; *Hook. f. Fl. Nov. Zel.* i (1853) 182; *Handb. N.Z. Fl.* (1864) 200; *Benth. Fl. Austral.* iv (1869) 446; *Cheesem. Man. N.Z. Fl.* (1906) 481.

Kermadec Islands, North and South Islands, Chatham Islands: Not uncommon as far south as Central Otago. Sea-level to 2000 ft. A common weed in almost all parts of the world.

2. **S. aviculare** *Forst. f. Prodr.* (1786) n. 107.—A leafy unarmed soft-wooded bush or shrub 4–10 ft. high, perfectly glabrous in all its parts; branches spreading, smooth or marked with raised lines decurrent from the petioles. Leaves alternate, petiolate, variable in size and shape, 4–12 in. long or even more, lanceolate or linear-lanceolate and entire, or irregularly pinnatifidly lobed with 1–3 spreading lanceolate acute lobes on each side, dark-green, membranous, glabrous; veins purplish or brownish-purple. Cymes 1–3 in the axils of the upper leaves or lateral, shorter than the leaves, few- or many-flowered. Flowers $\frac{3}{4}$–1 in. diam., purplish. Calyx-lobes short, broad, obtuse. Corolla shortly and broadly 5-lobed. Filaments as long as or longer than the anthers; anthers oblong, spreading, opening at the tips by transverse slits which are usually continued down the sides. Berry broadly ovoid, $\frac{3}{4}$–1 in. long, drooping, yellowish.—*A. Rich. Fl. Nouv. Zel.* (1832) 193; *Hook. f. Fl. Nov. Zel.* i (1853) 182; *Handb.*

N.Z. Fl. (1864) 200; *Benth. Fl. Austral.* iv (1869) 447; *Cheesem. Man. N.Z. Fl.* (1906) 481. S. laciniatum *Ait. Hort. Kew,* ed. 1 (1789) 247; *A. Cunn. Precur.* (1838) n. 386; *Raoul Choix* (1846) 43.

Var. **albiflora** *Cheesem. Trans. N.Z. Inst.* lii (1920) 11.—More slender; leaves pale-green, thinner and more delicate; veins pale-green or yellowish-green. Flowers white.

Kermadec Islands, North and South Islands, Chatham Islands: Abundant in lowland districts as far as Foveaux Strait. *Poporo; Poroporo; Kohoho.* Flowers most of the year.

Also common in many parts of Australia and Tasmania, and in Norfolk Island. The fruit is edible, and was made into jam by the early colonists. For further particulars respecting var. *albiflora,* see Trans. N.Z. Inst. lii (1920) 11.

Family XCIII. **SCROPHULARIACEAE.**

Herbs or shrubs, rarely small trees. Lower leaves usually opposite, upper alternate, or all opposite or all alternate; stipules wanting. Flowers generally irregular, hermaphrodite. Calyx inferior, persistent, 4–5-toothed or -lobed, sometimes of 5 free sepals. Corolla gamopetalous, hypogynous, commonly 2-lipped but sometimes almost regular, 4–5-lobed; lobes imbricate in bud. Stamens inserted on the tube of the corolla, either 2, or 4 in 2 pairs, 2 long and 2 short (didynamous), sometimes the rudiment of a fifth stamen is present or rarely all 5 are present and perfect; anthers 1–2-celled, cells distinct or confluent. Ovary superior, 2-celled; style simple; stigma entire, 2-lobed or 2-lamellate; ovules usually numerous in each cell, anatropous or amphitropous, placentas affixed to the septum. Fruit a 2-celled many-seeded capsule, rarely an indehiscent berry. Seeds small, generally numerous, various in form; albumen fleshy, seldom wanting; embryo straight or rarely curved.

A large family, scattered over the whole world, but far better represented in temperate regions or in mountainous districts than in very warm climates. Genera about 200; species estimated at 2600. The medicinal properties of the family are very various. A few species are purgative, others are astringent or tonic, a far greater number are acrid and bitter or even poisonous. The foxglove (*Digitalis*) is the only one largely used medicinally, although many others are occasionally employed. The family contains many handsome garden-plants, especially of the genera *Calceolaria, Antirrhinum, Pentstemon, Mimulus, Digitalis,* and *Veronica.* Of the 10 genera found in New Zealand, *Siphonidium* is endemic; *Jovellana* (which is hardly separable from *Calceolaria*) occurs elsewhere only in South America; *Ourisia* is also mainly South American, but extends to Tasmania as well; *Glossostigma* is confined to Australia and New Zealand. The remaining 5 have a wide distribution in both temperate and tropical regions.

A. Antirrhinidae. *Upper lip (or two upper lobes) of the corolla always outside the others in bud.*

* Stamens 2.

Calyx 4-partite. Corolla 2-lipped, lips inflated	1. Jovellana.
Calyx 5-partite. Corolla 2-lipped, lips not inflated	4. Gratiola.

** Stamens 4.

Flowers axillary in the New Zealand species. Calyx 5-angled and -toothed. Corolla 2-lipped. Stigma 2-lamellate ..	2. Mimulus.
Flowers in terminal racemes. Calyx 5-partite, not angled. Corolla 2-lipped. Stigma 2-lamellate	3. Mazus.
Flowers axillary, solitary. Calyx 3–4-lobed. Corolla nearly regular. Stigma spathulate	5. Glossostigma.
Flowers axillary. Calyx 5-toothed. Corolla rotate. Stigma clavate	6. Limosella.

B. Rhinanthideae. *Under-lip or lateral lobes of the corolla covering the upper in bud.*

* Stamens 2.

Shrubs or herbs. Leaves opposite, often imbricate and quadrifarious in the New Zealand species. Corolla rotate or tube short; limb 4-lobed or rarely 5-lobed .. .. .. 7. VERONICA.

** Stamens 4.

Corolla 5-lobed, campanulate or nearly so, tube short. Stigma capitate .. .. 8. OURISIA.

Corolla 2-lipped, tube short. Ovary usually with several ovules in each cell, rarely reduced to two .. .. .. 9. EUPHRASIA.

Corolla 2-lipped, tube exceedingly long, gibbous, upper lip entire. Stigma 2-lobed .. .. 10. SIPHONIDIUM.

1. **JOVELLANA** Ruiz and Pavoir. 1798.

Herbs or small under-shrubs, erect or creeping. Leaves opposite, simple; margins more or less toothed or crenate. Flowers in few- or many-flowered terminal panicles. Calyx inferior, 4-partite; segments subequal. Corolla-tube very short, 2-lipped; the lips nearly equal and both concave, the lower one not conspicuously larger and slipper-shaped. Stamens 2, inserted near the base of the corolla-tube; anther-cells contiguous, adnate. Style short; stigma capitate. Capsule ovate-conical, 2-celled. Seeds striate.

A small genus of 4 species, 2 of which are found in New Zealand, the remaining 2 in Chile. It is very closely allied to *Calceolaria*; from which it only differs in the 2 lips of the corolla being nearly alike in size, whereas in *Calceolaria* the lower lip is very much larger than the upper.

Stems erect. Leaves ovate, 1–3 in. long. Panicles usually many-flowered .. .. 1. *J. Sinclairii.*

Stems creeping. Leaves broadly ovate or orbicular, ½–1 in. long. Panicle 1–5-flowered .. .. 2. *J. repens.*

1. **J. Sinclairii** *Kranzl. in Pflanzenr.* Heft 28 (1907) 18.—More or less glandular-pubescent in all its parts. Stems slender, erect, laxly branched, 6–18 in. high. Leaves opposite, on slender petioles 1–3 in. long; blade 1–3 in., ovate or elliptic-ovate, obtuse or subacute, obliquely rounded or almost cordate at the base, coarsely crenate-toothed or -lobed, the lobes again toothed, membranous, pubescent on both surfaces, paler below. Panicles terminal, branched, few- or many-flowered; pedicels slender. Flowers small, ¼–⅓ in. diam., white or yellow spotted with purple. Calyx-lobes small, deltoid, acute. Corolla pubescent, divided about ⅓-way down into 2 nearly equal concave lips, the upper lip but slightly smaller. Stamens on very short filaments; anthers orbicular. Capsule ⅙ in. long.—*Hook. Ic. Plant.* (1843) t. 561; *Raoul Choix* (1846) 43; *Hook. f. Fl. Nov. Zel.* i (1853) 187; *Handb. N.Z. Fl.* (1864) 201; *Bot. Mag.* t. 6597; *Cheesem. Man. N.Z. Fl.* (1906) 483; *Ill. N.Z. Fl.* ii (1914) t. 147. C. albula *and* C. Sturmii *Col. in Trans. N.Z. Inst.* xxvii (1895) 391, 392. Jovellana albula *Kranzl. and* Sturmii *Kranzl. Pflanzenr.* Heft 28 (1907) 20.

NORTH ISLAND: From Hicks Bay and the East Cape to Hawke's Bay and the Ruahine Mountains, *Sinclair, Colenso! Bishop Williams! Guthrie-Smith! Adams* and *Petrie! W. Townson!* &c. Sea-level to 1500 ft. November–February.

Kranzlin, in his monograph of the genus printed in the "Pflanzenreich," admits Colenso's *Calceolaria albula* and *C. Sturmii* as distinct species, a view with which I cannot coincide. I cannot even separate them as varieties.

2. **J. repens**, *Kranzl. in Pflanzenr.* Heft 28 (1907) 20.—A slender much-branched creeping and rooting pubescent herb, stems 4–12 in. long; branches very slender, prostrate or ascending, sparingly leafy. Leaves opposite, on long slender petioles; blade ½–1½ in. long, broadly oblong or ovate to orbicular, coarsely and irregularly doubly toothed or crenate, very thin and membranous, sparingly pubescent on both surfaces. Panicles terminal, small, 1–5-flowered; pedicels almost filiform. Flowers about ¼ in. diam., white spotted with purple. Calyx adherent to the ovary at the base; lobes ovate, acute. Corolla divided about half-way down into two nearly equal concave entire lips, upper lip slightly smaller. Capsule ovoid-conic, membranous.—Calceolaria repens *Hook. f. Fl. Nov. Zel.* i (1853) 187; *Handb. N.Z. Fl.* (1864) 202; *Cheesem. Man. N.Z. Fl.* (1906) 484.

North Island: East Cape and Poverty Bay, *Bishop Williams!* Mount Egmont, *Buchanan!* sources of the Patea River, *T. F. C.;* Makatote Gorge, *T. F. C.;* ravines at the base of the Ruahine Mountains, *Colenso!* Mount Holdsworth, *Cockayne;* Mount Hector, *Petrie;* Maungatariri and Hutt Gorge, *B. C. Aston;* Rimutaka Range, *T. Kirk!* Wainuiomata, *T. P. Arnold.* South Island: Nelson—Cedar Creek and valley of the Lyell, *W. Townson!* Westland—Lake Brunner, *H. J. Matthews!* Otira and Teremakau Valleys, *Petrie! Cockayne! Jackson, Diels.* 250–2500 ft. December–February.

2. **MIMULUS,** Linn.

Erect or prostate herbs. Leaves opposite, entire or toothed. Flowers solitary and axillary, or the upper ones sometimes forming a terminal raceme. Calyx tubular or campanulate, 5-angled, 5-toothed. Corolla tubular at the base, 2-lipped above; upper lip erect or spreading, 2-lobed; lower spreading, 3-lobed; throat usually with 2 protuberances. Stamens 4, didynamous; anthers all perfect, 2-celled; cells divergent, often confluent at the top. Style slender; stigma of 2 flat laminae. Capsule loculicidally dehiscent, valves usually splitting away from a central column which bears the placentas. Seeds small, numerous.

A genus of about 75 species, most numerous in western America, found more sparingly in eastern and tropical Asia, South Africa, and Australia; not known in Europe in the wild state. The single New Zealand species extends to Australia and Tasmania.

1. **M. repens** *R. Br. Prodr.* (1810) 439.—Perfectly glabrous. Stems stout, succulent, creeping and rooting at the joints; branches prostrate or ascending or erect, 1–5 in. long. Leaves opposite, sessile, often stem-clasping, ⅛–¼ in. long, broadly ovate to oblong, obtuse, quite entire, thick and succulent, pitted when dry. Flowers few, axillary and solitary; peduncles stout, usually shorter than the leaves. Calyx broadly funnel-shaped or almost obconic, truncate at the mouth, minutely toothed. Corolla variable in size, ¼–½ in. diam., white with a yellow throat; tube dilated upwards, much longer than the calyx; lobes broad, rounded. Capsule broadly oblong, obtuse, enclosed in the calyx, about ¼ in. long.—*Hook. f. Fl. Nov. Zel.* i (1853) 188; *Handb. N.Z. Fl.* (1864) 202; *Bot. Mag.* (1864) t. 5423; *Benth. Fl. Austral.* iv (1869) 482; *Cheesem. Man. N.Z. Fl.* (1906) 484. M. Colensoi *T. Kirk in Trans. N.Z. Inst.* iii (1871) 179.

North and South Islands: Salt marshes from the North Cape to the south of Otago, not uncommon. November–January.

Mr. Kirk's *M. Colensoi* is a form with erect sparingly divided branches, but it does not otherwise differ from the type. The species is common in many parts of Australia and Tasmania.

3. **MAZUS** Lour. 1790

Small herbs, often prostrate and creeping. Lower leaves opposite or rosulate, upper ones when present often alternate. Flowers in terminal subsecund racemes or solitary. Calyx campanulate, 5-partite, not angled. Corolla-tube short; upper lip erect, 2-fid; lower larger, spreading, 3-fid; throat with 2 protuberances. Stamens 4, didynamous; anther-cells divergent, often confluent at the tip. Style slender; stigma 2-lamellate. Capsule loculicidally dehiscent, valves entire. Seeds numerous, very minute, ovoid.

A small genus of 8 or 10 species, extending northwards through Australia to the Malay Archipelago, India, and China. One of the New Zealand species is found in Australia and Tasmania, and is very closely allied to the Indian *M. rugosus*; the other is endemic.

Slender. Leaves ¾–3 in., linear-obovate or obovate-spathulate, membranous. Flowers small, about ¼ in. long .. .. 1. *M. pumilio.*

Stout. Leaves ½–2 in., obovate or oblong. Flowers large, ¾ in. long 2. *M. radicans.*

1. **M. pumilio** *R. Br. Prodr.* (1810) 439.—A small perennial herb with a creeping underground stem, putting up short leafy branches. Leaves close together, forming an erect tuft, variable in size, ¾–3 in. long including the petiole, obovate-spathulate, obtuse, gradually narrowed into the petiole, membranous, entire or irregularly sinuate-toothed, glabrous or sparingly pilose. Peduncles slender, usually exceeding the leaves, 1–6-flowered; pedicles long, each with a linear-setaceous bract. Calyx narrow-campanulate; lobes narrow, acute. Corolla ¼–½ in. long, white or blueish-white with a yellow centre; tube exceeding the calyx; lobes broad, rounded. Capsule included in the persistent calyx.—*Hook. Ic. Plant.* (1843) t. 567; *Hook. f. Fl. Nov. Zel.* i (1853) 189; *Handb. N.Z. Fl.* (1864) 202; *Benth. Fl. Austral.* iv (1869) 484; *Cheesem. Man. N.Z. Fl.* (1906) 485.

Engl. Icones. Gen. Pl. t. 102.

North Island: Auckland—Ahipara, *T. F. C.*; Matapouri, *Colenso!* Lower Waikato, *T. F. C.*, *Petrie! H. Carse!* Thames River, *Adams*; East Cape, *Bishop Williams!* Wellington—Manawatu River, *Colenso!* Otaki, *Buchanan!* Pencarrow Lagoon, *T. Kirk!* South Island: Canterbury—Kaikoura, *Cockayne*; Banks Peninsula, *Lyall*; Canterbury Plains, *Haast! J. B. Armstrong.* November–February.

2. **M. radicans** *Cheesem. Man. N.Z. Fl.* (1906) 486.—Stems creeping and rooting at the joints, often subterranean, putting up short erect leafy branches 1–3 in. high. Leaves close together, spreading, petiolate, ¾–2 in. long including the petiole, obovate or linear-obovate, obtuse, gradually narrowed into the petiole, entire or very obscurely sinuate, pilose or almost glabrous. Peduncle terminal, 1–3-flowered, usually longer than the leaves; pedicels with 1 or 2 linear-subulate bracts. Flowers large, ½–¾ in. long, white with a yellow centre. Calyx campanulate, 5-cleft, not angled, pilose with jointed hairs. Corolla-tube much exceeding the calyx; upper lip erect; lower lip much larger, spreading. Capsule ⅓ in. long, ovoid, enclosed in the persistent calyx.—Mimulus radicans *Hook. f. Fl. Nov. Zel.* i (1853) 188; *Handb. N.Z. Fl.* (1864) 202.

North Island: Wellington—Head of the Wairarapa Valley and Tararua Mountains, *Colenso! Buchanan!* South Island: Not uncommon throughout in wet places in mountain districts. 500–3500 ft. November–February.

Imperfect specimens of this were described by Sir J. D. Hooker as a *Mimulus*. It has, however, the habit, inflorescence, and calyx of *Mazus*, and I have consequently transferred it to that genus.

T. 71.91.

4. GRATIOLA Linn. 1737.

Herbs, glabrous or glandular-pubescent. Leaves opposite, entire or toothed. Flowers axillary and solitary, 2-bracteolate. Calyx deeply 5-partite; segments nearly equal. Corolla-tube cylindric; lips spreading, upper entire or 2-fid, lower 3-fid. Perfect stamens 2, included; anther-cells distinct, parallel; staminodia or barren stamens 2, filiform, sometimes wanting. Style filiform; stigma dilated and deflexed, entire or 2-lamellate. Capsule ovoid, loculicidally or septicidally dehiscent, 4-valved, valves separating from a columnar placentiferous axis. Seeds numerous, small, reticulate. See Kirk. Trans. 3:1871:165.

A genus consisting of about 25 species, scattered over the temperate and sub-tropical portions of both hemispheres. One of the New Zealand species has a wide range in Australia and extra-tropical South America: the other extends to Victoria and Tasmania alone.

Suberect, usually glabrous. Leaves $\frac{1}{4}$–$\frac{3}{4}$ in. long .. .. 1. *G. peruviana.*

Procumbent, usually glandular-pilose. Leaves $\frac{1}{6}$–$\frac{1}{4}$ in. .. .. 2. *G. nana.*

sexdenta A. Cunn.

1. **G. peruviana** *Linn. Sp. Plant.* (1753) 17.—Stems stout, glabrous or slightly viscid-pubescent, laxly branched, ascending or suberect from a decumbent or almost prostate base, 3–12 in. high. Leaves opposite, sessile, $\frac{1}{4}$–$\frac{3}{4}$ in. long, ovate or ovate-lanceolate or oblong, distantly and sometimes obscurely serrate, usually 3-nerved. Flowers in the axils of the leaves; peduncles very short, sometimes almost wanting. Calyx-segments lanceolate, acuminate. Corolla $\frac{1}{3}$–$\frac{1}{2}$ in. long, white or yellowish-white with a yellow throat, the lips broad, much shorter than the tube. Anthers connivent; cells transverse, parallel. Staminodia filiform, elongated. Capsule ovoid-globose, $\frac{1}{5}$ in. long, membranous.—*Benth. Fl. Austral.* iv (1869) 493; *Cheesem. Man. N.Z. Fl.* (1906) 486. G. sexdentata *A. Cunn. Precur.* (1838) n. 383; *Raoul Choix* (1846) 43; *Hook. f. Fl. Nov. Zel.* i (1853) 189; *Handb. N.Z. Fl.* (1864) 203. G. latifolia *R. Br. Prodr.* (1810) 435; *T. Kirk in Trans. N.Z. Inst.* iii (1871) 165. G. glandulifera *Col. in Trans. N.Z. Inst.* xvii (1885) 245.

North Island: Common in lowland swamps throughout. South Island: Nelson—Buller Valley, Charleston, *W. Townson!* near Ashburton, *H. H. Allan!* Otago—Lake Te Anau, *Petrie;* Lake Hauroko, *Crosby Smith.* Sea-level to 1500 ft. November–February.

Also common in Australia and Tasmania, and in many parts of extra-tropical South America.

2. **G. nana** *Benth. in DC. Prodr.* x (1846) 404.—Stems procumbent or creeping, much branched, often matted, 2–8 in. long, usually more or less clothed with jointed glandular hairs, but sometimes almost glabrous; branches ascending at the tips. Leaves sessile or very shortly petiolate, $\frac{1}{6}$–$\frac{1}{4}$ in. long, broad or narrow-oblong or obovate, obtuse or subacute, narrowed at the base, obtusely toothed, glabrous or glandular-pilose. Flowers few, on short peduncles. Calyx glandular-pilose; segments often toothed. Corolla $\frac{1}{4}$–$\frac{1}{3}$ in. long, white or white with pinkish veins, throat yellow; lobes short, rounded. Anthers connivent; cells transverse, parallel. Staminodia filiform, elongated. Capsule broadly ovoid. —*Hook. f. Handb. N.Z. Fl.* (1864) 203; *Benth. Fl. Austral.* iv (1869) 493;

Cheesem. Man. N.Z. Fl. (1906) 487. G. pubescens *Hook. f. Fl. Nov. Zel.* i (1853) 189 (*not of R. Br.*). G. concinna *Col. in Trans. N.Z. Inst.* xix (1887) 264.

North Island: Auckland—Bay of Islands, *R. Cunningham* (Handbook); swamps between the Manukau Harbour and Waikato River, *H. Carse!* Hawke's Bay—Norsewood, *Colenso!* Taranaki—Ngaire Swamp, *T. Kirk!* South Island: From Nelson to Southland, but not common. Sea-level to 2500 ft. November–February.

Apparently a variable little plant. South Island specimens are stouter and more densely leafy, and have larger flowers than those from the North Island. Also found in Victoria and Tasmania.

5. GLOSSOSTIGMA Arn. 1836

Very small perfectly glabrous creeping and rooting herbs. Leaves opposite or fascicled at the nodes, quite entire. Flowers minute, axillary, solitary, ebracteolate. Calyx campanulate, shortly and obtusely 3–4-lobed. Corolla-tube short; lobes 5, nearly equal. Stamens 2 or 4, affixed to the corolla-tube; filaments filiform; anther-cells diverging at the base, confluent at the top. Ovary perfectly or imperfectly 2-celled; style short, dilated upwards into a broad and thin spoon-shaped stigmatic lamina which usually curves over the stamens. Capsule globular or ovoid, included in the persistent calyx, loculicidally 2-valved; valves entire, separating from a central placentiferous axis. Seeds small, ovoid.

In addition to the 2 species found in New Zealand, 1 of which extends to Australia, there are 2 others in Australia, 1 of them found also in tropical Asia and Africa.

Forming broad matted patches. Leaves $\frac{1}{8}$–$\frac{1}{4}$ in., linear-obovate. Flowers $\frac{1}{10}$–$\frac{1}{8}$ in. diam. Stamens 4 .. .. .. 1. *G. elatinoides.*

Minute, very slender, matted. Leaves $\frac{1}{12}$–$\frac{1}{5}$ in., linear or narrow linear-spathulate. Flowers very minute, $\frac{1}{20}$ in. diam. Stamens 2 2. *G. submersum.*

1. **G. elatinoides** *Benth. in Hook. f. Fl. Nov. Zel.* i (1853) 189.—A small creeping intricately branched moss-like plant, forming dense matted patches 2–6 in. across or more; stems slender, rooting at the nodes, rarely suberect at the tips. Leaves opposite, $\frac{1}{8}$–$\frac{1}{4}$ in. long, linear-spathulate or linear-obovate, obtuse, gradually narrowed into a petiole equalling the blade. Peduncle at first shorter than the leaves, but often elongating after flowering. Flowers minute, $\frac{1}{10}$–$\frac{1}{8}$ in. diam., white. Calyx with 4 short obtuse lobes. Corolla-tube shorter than the calyx; lobes rounded, obtuse, fringed with minute cilia. Stamens 4, included. Style short; stigma very large, spoon-shaped, irritable. Capsule small, ovoid-globose.—*Hook. f. Handb. N.Z. Fl.* (1864) 203; *Benth. Fl. Austral.* iv (1869) 502. Tricholoma elatinoides *Benth. in DC Prodr.* x (1846) 426. Lobelia submersa *A. Cunn. Precur.* (1838) n. 424.

North and South Islands, Stewart Island: Abundant in lakes and marshes from the North Cape southwards, often entirely submerged. Sea-level to 2500 ft. November–February.

Also found in south-eastern Australia and Tasmania. For an account of the fertilization, see a paper by myself in Trans. N.Z. Inst. x (1878) 353.

2. **G. submersum** *Petrie in Trans. N.Z. Inst.* xxiii (1891) 401.—A minute very slender intricately branched plant, forming small but dense matted patches; stems creeping and rooting at the nodes. Leaves opposite or fascicled, $\frac{1}{12}$–$\frac{1}{4}$ in. long, linear or narrow linear-spathulate, quite entire, gradually narrowed into a petiole equalling the blade or rather shorter than it. Peduncles slender, axillary, about as long as the leaves. Flowers very minute, $\frac{1}{20}$ in. diam. Calyx obtusely 3-lobed. Corolla small, not much longer than the calyx; lobes short, rounded. Stamens 2, included. Capsule not exceeding the calyx, globose, $\frac{1}{15}$ in. diam.

SOUTH ISLAND: Otago—Tidal shores of Lake Waihola, usually submerged at high water, *Petrie!*

A very curious little plant, apparently closely allied to the Queensland *G. spathulatum* Arn., but my flowering specimens are insufficient for a proper comparison. I have seen no specimens except those gathered by Mr. Petrie.

6. **LIMOSELLA** Linn.

Small tufted creeping glabrous marsh or aquatic plants. Leaves opposite or fascicled at the nodes, rarely alternate on barren shoots, long-petioled, linear or spathulate, quite entire. Flowers minute, axillary, solitary. Calyx campanulate, 5-toothed or -lobed. Corolla campanulate or almost rotate; tube short; lobes 5, nearly equal. Stamens 4; filaments filiform; anther-cells confluent. Ovary 2-celled at the base; style short; stigma clavate or subcapitate. Capsule obscurely dehiscent or septicidally 2-valved; valves thin, membranous. Seeds numerous, small, ovoid, transversely rugulose.

A genus comprising 6 or 7 species, found in most parts of the world.

Leaves $\frac{1}{2}$–$1\frac{1}{2}$ in. long; lamina not much broader than the petiole. Flowers pedicelled; corolla and capsule longer than the calyx.. 1. *L. tenuifolia.*

Leaves 2–5 in. long; lamina ovate, suddenly contracted into the slender petiole. Flowers sessile; corolla and capsule shorter than the calyx .. .. 2. *L. Curdieana.*

(Hf.) Deutschlands Fl. I, 2 · 1804 · 19, 30.

1. **L. tenuifolia**, *Nutt. Gen. N. Amer.* ii (1818) 43.—Annual or perennial, creeping and tufted, often forming patches 1–2 in. diam. or more. Leaves densely fascicled, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, rarely more, narrow-linear or linear-subulate, often with little or no distinction between petiole and blade, but sometimes dilated towards the tip and becoming narrow linear-spathulate. Flowers minute, $\frac{1}{12}$ in. diam., axillary, on very short pedicels. Calyx 5-toothed. Corolla rather longer than the calyx; lobes ovate-oblong. Capsule ovoid-globose, exceeding the calyx when mature.—*Cheesem. Man. N.Z. Fl.* (1906) 489. L. aquatica *Linn. var.* tenuifolia *Hook. f. Fl. Nov. Zel.* i (1853) 190; *Handb. N.Z. Fl.* (1864) 204. L. australis *R. Br. Prodr.* (1810) 443. L. ciliata *Col. in Trans. N.Z. Inst.* xxi (1889) 96.

NORTH AND SOUTH ISLANDS: Common in wet places throughout. Sea-level to 3000 ft. November–February.

Often considered to be a variety of the widely diffused *L. aquatica* Linn., but the leaves have not the conspicuous lamina of that species, and the whole plant is usually much smaller. It also occurs in Australia and Tasmania, in temperate North and South America, and in some parts of Europe.

L. lineata Glück Bot. Jahrb. Band LXVI H. 5, 1934 P. 506. var. spathulata Glück: 510

2. **L. Curdieana** *F. Muell. Fragm. Phyt. Austral.* ix (1875) 166.—A perennial herb with tufts of radical leaves, emitting short thick stolons terminating in other tufts, glabrous in all its parts. Leaves numerous; petiole 2–4 in. long or more, filiform, terete, dilated towards the base; blade $\frac{1}{4}$–$\frac{3}{4}$ in. long, ovate or ovate-oblong, obtuse, suddenly contracted into the petiole, rather thin; main veins 3–5, parallel, with reticulating veinlets between. Flowers crowded at the bases of the petioles, sessile, minute. Calyx $\frac{1}{10}$ in. long or less, tipped with 5 minute teeth. Corolla altogether included in the calyx, shortly 5-lobed. Stamens 4, inserted on the corolla-tube. Style short; stigma capitate. Capsule included within the persistent calyx, $\frac{1}{10}$–$\frac{1}{8}$ in. diam., globose, rupturing irregularly. Seeds very numerous; testa reticulated.—*Cheesem. Man. N.Z. Fl.* (1906) 489.

See Glück p. 556

South Island: Otago—Watery places in the Manuherikia Valley, *Petrie*. Also in Australia.

A very curious plant, differing from all states of *L. aquatica* in the sessile flowers, included corolla, and capsule shorter than the calyx. I have seen no specimens except Mr. Petrie's, the flowers of which appear to be cleistogamic.

7. VERONICA Linn.

1735

Herbs or shrubs, rarely small trees. Leaves opposite or rarely the cauline alternate, often connate at the base, large or small and scale-like, spreading or appressed, often closely quadrifariously imbricate. Flowers in bracteate axillary or terminal racemes, more rarely in spikes or panicles or corymbs, sometimes solitary in the axils of the leaves or terminal. Calyx usually 4-partite, rarely 3- or 5-partite. Corolla-tube longer or shorter than the calyx, sometimes very short; limb spreading, usually 4-lobed, sometimes 5-lobed, seldom 3- or 6-lobed; lobes unequal or rarely equal, imbricate in the bud, the lateral ones or one of them outside. Stamens 2, very rarely 4 or 5; filaments long or short, inserted on the corolla-tube; anther-cells diverging or parallel, confluent at the tip. Ovary small, 2-celled; style slender; ovules few or many in each cell. Capsule 2-celled, compressed or turgid, grooved on each side, either septicidally dehiscent with the placentas separating, or loculicidal with the valves remaining attached to the undivided placental column or separating from it. Seeds few or many, ovate or orbicular, compressed, attached by the inner flat surface.

A genus of nearly 275 species, most abundant in New Zealand and in the temperate regions of the Northern Hemisphere, rare and almost absent in the tropics. In New Zealand it is by far the largest genus of flowering-plants, and in montane or subalpine districts forms a conspicuous portion of the vegetation. Many of the species are singularly beautiful in form, foliage, and flower; and from that reason, and from the ease with which they can be cultivated, a considerable number have become well established in gardens throughout the Dominion and in Europe. Of the 103 species admitted in this book, all but 3 are endemic. These are *V. elliptica*, which is found in the Falkland Islands, Fuegia, and South Chile; *V. plebeia*, which is not uncommon in east Australia; and *V. Anagallis*, which has a wide distribution in the North Temperate Zone. But the last is probably an introduction. The distribution of the species within the Dominion is peculiar. Twenty-one are confined to the North Island, and no less than 61 to the South Island, while only 12 species are found in both Islands. Five are endemic in the Chatham Islands, 2 in the Auckland and Campbell Islands, and 1 in the Kermadec Islands. Of the 103 species, 59 are purely

see Ckn. Trans. 60: 1929: 465
57. 1926: 11–47.
"Parahebe" see Cheesem. Rec. Dom. Mus. 1–1944–228.

P. lanceolata "

montane or alpine, not one of them descending below 1000 ft. altitude; 17 are both lowland and montane; 14 are purely lowland, but do not evince any special predilection for the sea-coast; while 13 are never seen far from the sea.

Veronica presents great difficulties to the systematist. Many of the species are singularly protean in habit, foliage, and inflorescence, varying so much in appearance that it is no easy matter to fix their real limits. Intermediate forms are numerous, connecting species that would otherwise appear most distinct, and in not a few cases these intermediates blend so freely into one another that an apparently continuous series of forms is produced, while several species hybridize so readily in cultivation that the supposition at once arises that natural hybrids may also occur. So great has been the difficulty in deciding what are the limits of the species, and in properly characterizing

VERONICA Linn = HEBE (Juss) Pennell.

Distinction between Hebe and Veronica:-

"...The capsule dehisces septicidally, the thick septum splitting and each carpel opening distally by a median slit through the septal wall.
The leaves are always opposite, and after falling leave more or less conspicuous scars.
The flowers are usually in axillary racemes, but these may be greatly reduced, spicate, or corymbose.
All are ever-green shrubs, or in a few cases, trees ....."

see T.N.Z.I. Vol. 56 - p. 24.
(Cockayne and Allan).

this work, with such deviations as the progress of discovery and the advance of botanical science have rendered advisable. The great activity with which the genus has been studied of late years has naturally led to a considerable increase in the number of the species, the 84 species of 1906 having now advanced to 103. The arrangement and limitation of the species, and the preparation of the necessary diagnoses, has proved to be a most difficult and perplexing task, and I am far from satisfied with the result. But, imperfect though it may be, it represents many months' assiduous study, and the examination of some thousands of specimens, and is, at any rate, an honest effort to clear away some of the difficulties which impede the study of the genus.

Students using the conspectus should bear in mind that the characters employed are in many cases arbitrary ones selected to show how the dominant forms of a certain species differ from those of another species, and do not always include the entire range of variation of a species. Plants like *V. salicifolia, macrocarpa, parviflora, Traversii, buxifolia, pinguifolia,* &c., which run into numberless varieties, are probably quite incapable of rigid definition.

It should be mentioned that several species from the Northern Hemisphere have become naturalized in New Zealand, the most abundant being *V. serpyllifolia, V. arvensis, V. agrestis,* and *V. persica.* Descriptions of these will be found in any British Flora.

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Two papers of considerable importance dealing with the New Zealand species appeared shortly after the publication of the Handbook. The first is Mr. Armstrong's "Synopsis of the New Zealand Species of *Veronica*" (Trans. N.Z. Inst. xiii (1881) 344). This is mainly based on observations made during the author's explorations in the Alps of Canterbury, and on the study of the fine collection of living plants which he had amassed in the Christchurch Botanical Gardens. It contains descriptions of a considerable number of new species, and many observations of value. Unfortunately, Mr. Armstrong did not distribute types of his new species, so that in some cases their identification is uncertain. The second is Mr. Kirk's "Notes on certain Veronicas" (Trans. N.Z. Inst. xxviii (1896) 515). In this Mr. Kirk transfers to the genus those species which had been erroneously placed in *Logania* and *Mitrasacme* by previous authors. Descriptions are also given of five or six new forms, in addition to much new matter bearing on the geographical distribution, &c., of the species already known. Another contribution of considerable value consists of the coloured drawings and descriptions published from time to time by Sir J. D. Hooker in the *Botanical Magazine*. Altogether, about 20 species have been beautifully illustrated and described by him, the value of the descriptions being enhanced by the critical notes which accompany them. Since the publication of the Handbook, too, the important fact has been made known by Kirk and others that the whole of the species with minute scale-like leaves (answering to Section III of the following conspectus) have dimorphic foliage, the leaves of the young state being widely different from those of the mature plant. It has also been shown that these early leaves are often produced by reversion on old specimens, especially when cultivated in a cool and moist situation. The student will find the early leaves of several species fully described in the excellent series of papers on the "Seedling Forms of New Zealand Phaenogams," contributed by Dr. Cockayne to past volumes of the Transactions of the New Zealand Institute.

Herewith I have mainly followed the arrangement adopted in the first edition of this work, with such deviations as the progress of discovery and the advance of botanical science have rendered advisable. The great activity with which the genus has been studied of late years has naturally led to a considerable increase in the number of the species, the 84 species of 1906 having now advanced to 103. The arrangement and limitation of the species, and the preparation of the necessary diagnoses, has proved to be a most difficult and perplexing task, and I am far from satisfied with the result. But, imperfect though it may be, it represents many months' assiduous study, and the examination of some thousands of specimens, and is, at any rate, an honest effort to clear away some of the difficulties which impede the study of the genus.

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DIVISION I, HEBE. *Capsule turgid or dorsally compressed, the septum across the broadest diameter. Erect or decumbent shrubs from a few inches to 12 or 15 ft. high, more rarely becoming small trees 20–25 ft. high. Flowers in axillary racemes or spikes, more rarely corymbose, very rarely solitary.*

SUBDIVISION A. Leaves quite entire (sometimes minutely incised in *V. salicifolia, amabilis, diosmaefolia, Colensoi,* and others; occasionally toothed in *V. Haastii*).

Section I. Large shrubs or small trees. Leaves 1–6 in. long, broad or narrow, lax, spreading, not imbricating. Racemes simple, longer than the leaves, many-flowered. Mainly lowland or coastal species.

* Leaves obovate to oblong-lanceolate or lanceolate, usually more than $\frac{1}{3}$ in. broad (sometimes less in *V. divergens, ligustrifolia,* and *chathamica*).

Leaves 2–4 × 1–1$\frac{3}{4}$ in., obovate, obtuse, dark-green. Racemes not much longer than the leaves, broad and dense. Flowers large, $\frac{1}{4}$–$\frac{1}{3}$ in. diam. Capsule $\frac{1}{4}$–$\frac{1}{3}$ in., twice as long as the calyx .. .. 1. *V. speciosa.*

Leaves 2–4 × $\frac{1}{2}$–1 in., linear-oblong, fleshy, pale-green. Racemes 3–5 in. Flowers $\frac{1}{4}$ in. diam. Capsule $\frac{1}{5}$–$\frac{1}{4}$ in., nearly thrice as long as the calyx .. .. 2. *V. Dieffenbachii.*

Leaves 2–3 × $\frac{3}{4}$–1$\frac{1}{2}$ in., oblong to elliptic-oblong. Racemes 2–3 in. Flowers $\frac{1}{5}$ in. diam. Capsule twice as long as the calyx .. .. 3. *V. Dorrien-Smithii.*

Leaves 1$\frac{1}{2}$–2 × $\frac{1}{3}$–$\frac{2}{3}$ in., lanceolate or oblong-lanceolate, fleshy. Racemes 1$\frac{1}{2}$–2$\frac{1}{2}$ in. Flowers $\frac{1}{5}$ in. diam. Capsule $\frac{1}{6}$ in., twice as long as the calyx .. .. 4. *V. Barkeri.*

Quite glabrous. Leaves 1$\frac{1}{2}$–3 in. × $\frac{1}{2}$–$\frac{2}{3}$ in., lanceolate to oblong-lanceolate, acute, almost amplexicaul. Flowers purple, $\frac{1}{3}$ in. diam. Capsule $\frac{1}{4}$ in., broadly ovoid, acute .. 5. *V. Adamsii.*

Leaves 1–3 in. × $\frac{1}{2}$–$\frac{2}{3}$ in., obovate-oblong, obtuse. Flowers pale-lilac, $\frac{1}{3}$ in. diam. Racemes long, pubescent. Capsule ovoid, acute .. .. 6. *V. Bollonsii.*

Diffusely branched, 2–3 ft. high. Leaves 1–2 × $\frac{2}{3}$–1 in. broad, oblong to obovate-oblong, margins edged with short white hairs. Flowers $\frac{1}{5}$ in., bluish-white .. .. .. 7. *V. obtusata.*

Leaves 1$\frac{1}{2}$–3 × $\frac{1}{2}$–1$\frac{1}{2}$ in., obovate-oblong to linear-oblong. Racemes 2–5 in., often curved, very dense. Flowers $\frac{1}{8}$–$\frac{1}{6}$ in. diam. Capsule $\frac{1}{8}$ in., nearly twice as long as the calyx .. 8. *V. macroura.*

Leaves 2–4 × 1$\frac{1}{4}$–2 in., broadly oblong. Racemes 3–6 in., densely flowered. Flowers small, $\frac{1}{8}$ in. diam. Capsules densely crowded, exceeding the calyx .. .. .. 9. *V. Cookiana.*

Leaves $\frac{3}{4}$–1$\frac{1}{4}$ × $\frac{1}{4}$–$\frac{1}{2}$ in., oblong or elliptic-oblong. Racemes 2–3 in., dense-flowered. Flowers $\frac{1}{5}$ in. diam. Calyx-segments ovate-oblong, equalling the short corolla-tube. Capsule $\frac{1}{6}$ in., elliptic, twice as long as the calyx .. .. 10. *V. divergens.*

Leaves 1–2 × $\frac{1}{4}$–$\frac{1}{2}$ in., linear-oblong to oblong-lanceolate, obtuse or subacute. Racemes 2–3 in., lax. Flowers $\frac{1}{5}$–$\frac{1}{4}$ in. diam. Calyx-segments ovate-lanceolate, acute, longer than the short and broad corolla-tube. Capsule $\frac{1}{5}$ in. .. .. 11. *V. ligustrifolia.*

Leaves 1$\frac{1}{2}$–3 × $\frac{1}{3}$–$\frac{1}{2}$ in., oblong-lanceolate, pubescent with short soft hairs. Other characters as in *V. salicifolia* .. 12. *V. pubescens.*

Near to *V. salicifolia,* but leaves broader and thinner, racemes shorter than the leaves, and calyx not much shorter than the capsule .. .. 13. *V. breviracemosa.*

Leaves 2–6 × $\frac{1}{3}$–$\frac{2}{3}$ in., lanceolate or oblong-lanceolate, acute, glabrous. Racemes 3–10 in. Flowers $\frac{1}{6}$ in. diam. Corolla-tube longer than the calyx. Capsule $\frac{1}{8}$–$\frac{1}{6}$ in., ovate, acute, scarcely twice the length of the calyx .. .. .. 14. *V. salicifolia.*

Largest species of the genus, 20 – 30 ft. or more. Main characters those of *V. salicifolia;* but leaves of juvenile plants coarsely toothed and ciliate .. .. .. 15. *V. gigantea.*

Leaves 3–4 × ¾–1¼ in., oblong or elliptic-lanceolate, subacute. Racemes 3–6 in. Flowers ⅕ in. diam. Capsule ⅕ in., suborbicular, obtuse, twice as long as the calyx .. .. 16. *V. rotundata.*

Leaves 3–6 × ⅓–1 in., lanceolate, acute. Racemes 3–7 in. Flowers large, ¼–⅓ in. diam. Capsule large, ¼–⅓ in., ovate, acute, thrice as long as the calyx .. .. .. 17. *V. macrocarpa.*

Leaves 2–3 × ¼–⅓ in., linear-lanceolate, coriaceous. Racemes 3–6 in., lax-flowered. Flowers ¼ in. diam. Differs from *V. macrocarpa* in the smaller, narrower, and more rigid leaves .. .. 18. *V. Townsoni.*

Leaves 1–3 × ½–1 in., elliptic-lanceolate or elliptic-oblong, acute. Racemes 2–4 in., lax. Flowers large, ⅓ in. diam., white. Calyx-segments acute. Capsule ¼ in., twice as long as the calyx .. .. 19. *V. amabilis.*

Leaves 1½–2½ × ¾–1 in., oblong or elliptic-oblong, margins and midrib and branchlets pubescent. Racemes short, stout, 2–2½ in. Flowers large, ⅓ in. diam., bluish-white. Capsule ¼ in., twice as long as the calyx.. .. .. 20. *V. Lewisii.*

Prostrate or trailing. Leaves ½–1½ × ¼–¾ in., obovate-oblong to elliptic-oblong, obtuse. Racemes short and dense, obtuse. Flowers ⅕–¼ in. diam. Capsule twice as long as the calyx 21. *V. chathamica.*

** Leaves narrow, linear-lanceolate or narrow linear-oblong, never more than ⅓ in. broad.

Small shrub. Leaves 2–3 × ⅙–¼ in., linear-lanceolate, obtuse, flat. Racemes 2–4 in. Calyx-segments long, ovate-lanceolate, acute, exceeding the short and broad corolla-tube .. 22. *V. acutiflora.*

Large spreading shrub. Leaves 1½–3½ × ⅙–¼ in., narrow-linear or linear-lanceolate, often deflexed. Racemes 2–5 in., longer than the leaves. Flowers ⅛ in. diam. Calyx-segments small, oblong, obtuse, ⅓ the length of the narrow corolla-tube .. .. 23. *V. angustifolia.*

Large shrub or small tree, 6–20 ft. Leaves 1–2½ × ⅙–¼ in., linear-lanceolate, acute. Racemes equalling the leaves, dense-flowered. Flowers ⅙ in. diam. Calyx-segments broadly oblong, obtuse, ½ the length of the broad corolla-tube. Capsule ⅙ in. .. .. 24. *V. parviflora.*

Leaves ¾–1¼ × ⅕–⅓ in., linear-oblong, obtuse, flat. Racemes 2–4 in., much longer than the leaves. Flowers ⅛–⅕ in. diam. Calyx-segments small, oblong, obtuse, about ½ the length of the corolla-tube. Capsule ⅕ in., broadly oblong .. 25. *V. leiophylla.*

Leaves 1–2½ × ⅕–⅓ in., lanceolate, acute, flat. Racemes 3–5 in., much longer than the leaves. Flowers ⅙–⅕ in. diam. Calyx-segments short, obtuse, not much shorter than the corolla-tube. Capsule ⅛ in. long, broadly oblong .. 26. *V. gracillima.*

Section II. Large or small shrubs, erect or decumbent below. Leaves ⅙–1¼ in. long, usually close-set, often imbricate, flat or concave or keeled. Racemes or spikes usually short, simple, or corymbosely branched, often crowded towards the ends of the branches.

* Flowers racemose; racemes more or less corymbosely branched, rarely simple.

Leaves ¾–1¼ × ⅙–⅓ in., oblong-obovate, flat or nearly so, glaucous. Racemes corymbosely branched, ¾–1½ in. long. Flowers ¼ in. diam., lavender-blue. Calyx-segments ovate, acute. Corolla-tube ½ as long again as the calyx. Capsule more than twice as long as the calyx .. .. .. 27. *V. insularis.*

Leaves ½–¾ × ¼ in., elliptic-oblong, acute, flat or nearly so. Racemes much branched, forming a terminal panicle 2 in. diam. Flowers ¼–⅓ in. diam., white. Calyx-segments narrow-ovate, acute. Corolla-tube slightly longer than the calyx .. .. 28. *V. venustula.*

Leaves ½–1 × ⅛–⅙ in., linear-oblong, rigid, acute, keeled. Racemes about 1 in., much corymbosely branched. Calyx usually 3-partite; segments obtuse. Corolla-tube not much longer than the calyx. Capsule ⅙ in., twice as long as the calyx .. .. 29. *V. diosmaefolia.*

Leaves ½–1 × ⅙–¼ in., lanceolate or linear-oblong, acute, flat or slightly keeled. Racemes 1–2 in., much corymbosely divided. Calyx 4-partite; segments acute. Corolla-tube twice as long as the calyx. Capsule ⅕ in. .. .. 30. *V. Menziesii.*

Leaves ¾–1½ × ⅕–⅓ in., linear-oblong, acute, flat, glaucous, margins often incised. Racemes exceeding the leaves, sparingly divided, rarely simple. Calyx-segments ovate-lanceolate, acute. Corolla-tube shorter than the calyx .. 31. *V. Colensoi.*

Leaves ½–¾ × ⅙–¼ in., linear-oblong or narrow obovate-oblong, acute, keeled, rigid, glaucous. Racemes short, equalling the leaves, trifurcate. Calyx-segments oblong, obtuse. Corolla-tube nearly twice as long as the calyx. Capsule ⅛–⅙ in. .. 32. *V. rigidula.*

Leaves ½–1 × ¼–⅓ in., long-petioled, linear-obovate to linear-oblong, obtuse, flat, glaucous. Racemes trifurcate. Calyx-segments oblong, obtuse. Corolla-tube ½ as long again as the calyx. Capsule ¼ in. long, broadly oblong .. .. 33. *V. rupicola.*

Leaves ⅓–⅔ × ⅕–⅓ in., ovate-oblong or obovate-oblong, closely imbricate, rigid, keeled. Racemes ¾–1¼ in., corymbosely branched. Calyx-segments oblong, obtuse. Corolla-tube less than twice as long as the calyx .. .. .. 34. *V. laevis.*

** Flowers racemose; racemes simple, rarely branched.

Leaves ½–1¼ × ¼–½ in., elliptic-oblong, apiculate, petiolate. Branchlets and margins of leaves hoary. Racemes 1–1½ in. long. Flowers large, white, ½ in. diam. or more, sweet-scented. Capsule ¼–⅓ in. .. .. 35. *V. elliptica.*

Leaves ¾–1½ × ⅕–⅔ in., oblong or elliptic-oblong, obtuse, flat. Racemes 2–4 in. long, dense. Flowers large, white or purplish, ⅓ in. diam. Calyx-segments oblong, obtuse. Corolla-tube twice as long as the calyx .. .. .. 36. *V. Matthewsii.*

Leaves ¾–1¼ × ¼–½ in., elliptic-oblong to lanceolate, acute. Racemes long and slender, 2–3 in. long. Corolla-tube twice as long as the calyx .. .. 37. *V. Carsei.*

Leaves ⅓–¾ in., elliptic-ovate, margins red. Racemes 2–3 in. long. Flowers large, pale violet-blue, ⅓–½ in. diam. Calyx-segments acute, equalling the short corolla-tube .. .. 38. *V. Balfouriana.*

Leaves ½–¾ × ⅙–⅓ in., ovate-lanceolate to narrow elliptic-oblong, acute, flat, glaucous. Racemes ¾–1½ in. long. Flowers white, ¼ in. diam. Calyx-segments broadly ovate, almost as long as the corolla-tube .. .. .. 39. *V. Darwiniana.*

Leaves ½–1 × ⅙–⅓ in., elliptic-oblong or elliptic-lanceolate, acute, keeled or flat, often close-set. Racemes 1–3 in. long. Flowers white, ¼ in. diam. Calyx-segments broadly oblong, obtuse, corolla-tube nearly twice as long as the calyx (longer in var. *elegans*) .. .. 40. *V. Traversii.*

Leaves ½–1¼ × ⅓ in. broad, narrow-elliptic, uniform in size and shape. Racemes 1–3 in. long, dense-flowered. Flowers small, ⅕ in. diam., white .. .. 41. *V. evenosa.*

Leaves ¾–1½ × ⅕–⅓ in., lanceolate, acute or subacute, flat. Racemes 1–2 in. long. Calyx-segments ovate-lanceolate, acute. Corolla-tube scarcely longer than the calyx; limb longer than the tube .. .. 42. *V. subalpina.*

Leaves ¼–⅔ × ⅙–⅓ in., obovate-oblong, flat, obtuse or apiculate, often distichous. Racemes ½–1½ in. Calyx-segments oblong, obtuse, equalling the corolla-tube. Capsule twice as long as the calyx or more .. .. 43. *V. vernicosa.*

Leaves ¾–1 × ¼–⅓ in., narrow-obovate, obtuse, flat or nearly so. Racemes 1–2 in., lax. Calyx-segments ovate-oblong, obtuse. Corolla-tube slightly longer than the calyx .. 44. *V. obovata.*

Leaves ⅔–1 × ⅕–½ in., obovate-oblong or elliptic-oblong, obtuse or subacute, slightly concave, usually close-set. Racemes 1–1½ in. long. Calyx-segments oblong-ovate, obtuse. Corolla-tube scarcely longer than the calyx .. .. 45. *V. monticola.*

Leaves ⅓–⅔ × ¼–⅓ in., oblong or obovate-oblong, obtuse, flat, glaucous beneath, black when dry; branchlets pubescent. Racemes ½–1 in. Flowers ¼–⅓ in., white. Calyx-segments ovate-oblong, obtuse. Corolla-tube as long as the calyx .. 46. *V. Cockayniana.*

*** Flowers spicate (often racemose in *V. decumbens*). Spikes usually simple. Leaves close-set, imbricate, concave, rounded or keeled at the back.

Leaves $\frac{1}{3}$–$\frac{3}{4} \times \frac{1}{5}$–$\frac{1}{3}$ in., obovate-oblong, closely imbricate, keeled, truncate or subcordate at the base. Spikes crowded at the ends of the branches; bracts large, coriaceous .. 47. *V. buxifolia.*

Leaves $\frac{1}{2}$–$\frac{2}{3} \times \frac{1}{4}$ in. broad, horizontally spreading, elliptic-ovate, margins minutely crenulate. Flowers white, $\frac{1}{4}$–$\frac{1}{3}$ in. diam.; tube equalling the calyx .. .. 48. *V. odora.*

Leaves $\frac{1}{3}$–$\frac{3}{4} \times \frac{1}{8}$–$\frac{1}{5}$ in., linear-oblong, keeled. Spikes crowded, forming a short terminal panicle. Corolla often 3-lobed, the anticous lobe either suppressed or very small .. .. .. 49. *V. anomala.*

Leaves $\frac{1}{3}$–$\frac{2}{4} \times \frac{1}{5}$–$\frac{1}{3}$ in., oblong-obovate, flat or slightly concave, margins bright-red. Racemes short, dense. Calyx-segments ovate, acute. Corolla-tube twice as long as the calyx. Capsule ovate, acute, glabrous .. .. .. 50. *V. decumbens.*

Leaves $\frac{1}{3}$–$\frac{2}{5} \times \frac{1}{4}$ in. broad, oblong-obovate to elliptic-obovate. Racemes 1–1$\frac{1}{2}$ in. long, dense-flowered. Flowers white, $\frac{1}{4}$ in. diam. Capsule broadly oblong-ovate, acute .. .. 51. *V. Willcoxii.*

Leaves $\frac{1}{3}$–$\frac{3}{4} \times \frac{1}{4}$–$\frac{1}{2}$ in., ovate, margins fringed with long soft hairs. Racemes slightly longer than the leaves, densely villous. Calyx-segments lanceolate, acute. Corolla-tube nearly twice as long as the calyx .. .. .. 52. *V. Gibbsii.*

Leaves $\frac{1}{3}$–$\frac{3}{4} \times \frac{1}{5}$–$\frac{2}{3}$ in., broadly obovate or suborbicular, deeply concave, glaucous, nerveless. Spikes crowded, short, stout, dense. Calyx-segments obtuse, equalling the corolla-tube. Capsule ovate, acute, glabrous .. .. .. 53. *V. carnosula.*

Leaves $\frac{1}{2}$–$\frac{3}{4}$ in. long, $\frac{1}{5}$–$\frac{1}{3}$ in. broad, obovate-oblong or oblong. Racemes numerous, 1–1$\frac{1}{2}$ in. long. Flowers small, white. Corolla short .. .. 54. *V. Biggari.*

Leaves $\frac{2}{3}$–1 $\times$ $\frac{1}{3}$–$\frac{1}{2}$ in. broad, oblong-ovate to broadly oblong, sessile, glaucous, concave. Racemes stout, many-flowered. Flowers white. Capsule ovoid, glabrous .. .. 55. *V. albicans.*

Leaves $\frac{1}{2}$–1$\frac{1}{4} \times \frac{1}{3}$–$\frac{2}{3}$ in., cordate or semiamplexicaul, deeply concave, glaucous, nerveless. Spikes 1–1$\frac{1}{2}$ in. long, dense. Calyx-segments obtuse, equalling the corolla-tube. Capsule oblong, obtuse, pubescent .. .. 56. *V. amplexicaulis.*

Leaves $\frac{1}{4}$–$\frac{3}{4} \times \frac{1}{6}$–$\frac{1}{2}$ in., obovate-oblong or suborbicular, deeply concave, glaucous, nerveless. Spikes short, dense. Calyx-segments obtuse, equalling the corolla-tube. Capsule oblong or obovate, obtuse, pubescent .. .. 57. *V. pinguifolia.*

Leaves $\frac{1}{8}$–$\frac{1}{3} \times \frac{1}{6}$–$\frac{1}{4}$ in., broadly oblong or suborbicular, concave, nerveless, very coriaceous. Spikes short, dense, villous. Calyx-segments obtuse, exceeding the corolla-tube. Capsule oblong, obtuse, pubescent .. .. 58. *V. Buchanani.*

Leaves $\frac{1}{8}$–$\frac{1}{3}$ in., obovate-oblong to lanceolate, usually lax, glaucous, obtusely keeled. Spikes $\frac{1}{2}$–1 in., villous. Calyx-segments ovate, acute, exceeding the corolla-tube. Capsule ovate, acute, glabrous or pubescent .. .. .. 59. *V. pimeleoides.*

Section III. Small shrubs, erect or decumbent or prostrate. Leaves dimorphic; of mature plants small, short and thick, densely quadrifariously imbricated or rarely in distant pairs; of young plants larger, spreading, entire or irregularly lobulate or pinnatifid. Flowers crowded near the tips of the branches or in subterminal 2–4-flowered abbreviated spikes.

* Prostrate or decumbent, rarely erect. Flowers in 2–4-flowered abbreviated spikes near the ends of the branches and distinct from them.

Laxly branched, 3–12 in. long; branches $\frac{1}{3}$ in. diam. Leaves $\frac{1}{6}$–$\frac{1}{3}$ in., erecto-patent, linear-oblong, obtuse, margins strongly ciliate-denticulate .. .. 60. *V. Gilliesiana.*

Much and closely branched, 3–9 in. diam.; branches $\frac{1}{12}$–$\frac{1}{10}$ in. diam., tetragonous with the faces concave. Leaves most densely quadrifarious, $\frac{1}{14}$–$\frac{1}{10}$ in., ovate or narrow-deltoid, narrowed to a subacute point .. .. 61. *V. tetrasticha.*

Much and closely branched, 3–9 in. diam.; branches $\frac{1}{15}$ in. broad, tetragonous with the faces flat. Leaves most densely quadrifarious, $\frac{1}{18}$–$\frac{1}{16}$ in. long, broadly triangular, acute .. 62. *V. quadrifaria.*

H. corrugata Cheesem. T. 60 (1929) 573 S. & B. 73:166 & 75:193.
H. dilatata S. & T. 73: 164.
H. recurva S. & T. 70: 30. 1940.
H. subsalvifolia S. & T. 73: 163
H. breviracemosa Summerhayes Kew Bull. 1937: 397.

§ Erect or spreading or rarely decumbent. Flowers 3–8 near the ends of the branches, forming small terminal heads; bracts similar to the leaves or broader.

† Leaves densely imbricate with the opposite pairs connate and appressed, concealing the branch and giving it somewhat of the appearance of whipcord.

Prostrate, forming patches 6–18 in. across; branches $\frac{1}{12}$–$\frac{1}{10}$ in. diam., obtusely tetragonous. Leaves densely quadrifarious, $\frac{1}{15}$–$\frac{1}{12}$ in. long, broadly ovate-deltoid, obtuse, tumid .. 63. *V. tumida.*

Allied to *V. tetragona*, but habit more depressed, size smaller, leaves tumid and scarcely keeled on the back, and flowers smaller .. .. 64. *V. Astoni.*

Stout, erect; branches tetragonous, $\frac{1}{10}$–$\frac{1}{6}$ in. diam. Leaves $\frac{1}{12}$–$\frac{1}{10}$ in. long, deltoid-ovate, obtuse .. .. .. 65. *V. tetragona.*

Stout, erect; branches tetragonous, $\frac{1}{10}$–$\frac{1}{6}$ in. diam. Leaves $\frac{1}{12}$–$\frac{1}{10}$ in. long, broadly deltoid-ovate, suddenly narrowed into a short obtuse cusp .. .. 66. *V. lycopodioides.*

Stout, erect; branchlets terete or obscurely tetragonous, $\frac{1}{8}$–$\frac{1}{6}$ in. diam., blackish-brown when dry. Leaves connate into a closely appressed ring $\frac{1}{10}$ in. long, orbicular-oblong, obtuse 67. *V. Hectori.*

Small, decumbent at the base, 6–10 in. high; branches terete or obscurely tetragonous, $\frac{1}{10}$–$\frac{1}{8}$ in. diam. Leaves connate at the base, $\frac{1}{10}$–$\frac{1}{6}$ in. long, ovate-deltoid .. .. .. 68. *V. Laingii.*

Stout, erect or decumbent; branches terete or obscurely tetragonous, $\frac{1}{12}$–$\frac{1}{10}$ in. diam., blackish-brown when dry. Leaves connate into a closely appressed ring $\frac{1}{10}$ in. long, tips obtuse or subacute .. .. 69. *V. coarctata.*

Small, slender, erect, 6–12 in. high. Ultimate branchlets $\frac{1}{14}$–$\frac{1}{12}$ in. diam., tetragonous. Leaves quadrifariously imbricate, connate at the base, triangular, keeled on the back and longitudinally grooved on the sides. Flowers in 6–12-flowered heads .. .. 70. *V. Poppelwellii.*

Strict, erect; branchlets terete, $\frac{1}{14}$–$\frac{1}{12}$ in. diam., yellow-green when dry. Leaves connate into a closely appressed ring $\frac{1}{15}$–$\frac{1}{12}$ in. long, subacute or truncate at the tip .. .. 71. *V. salicornioides.*

Spreading, much branched; branches often flabellate; branchlets terete, slender, $\frac{1}{16}$–$\frac{1}{14}$ in. diam. Leaves connate into an obconic sheath or ring $\frac{1}{10}$ in. long loosely investing the branch, and which is open at the top and truncate or nearly so .. .. 72. *V. Armstrongii.*

Closely allied to *V. Armstrongii*, but much shorter and stouter, leaf-sheaths shorter and tighter, with truncate margins .. .. 73. *V. annulata.*

Spreading or decumbent; branchlets terete, very slender, $\frac{1}{20}$ in. diam. Leaves connate into a narrow sheath $\frac{1}{10}$–$\frac{1}{8}$ in. long, lower part adnate to the branch, upper part free and slightly expanded .. .. 74. *V. propinqua.*

†† Leaves in remote decussate pairs.

Branchlets slender, $\frac{1}{30}$ in. diam. Leaves minute, appressed or patent, $\frac{1}{25}$–$\frac{1}{15}$ in. long .. .. 75. *V. cupressoides.*

Section IV. Small decumbent or prostrate shrubs; branches short, ascending. Leaves small, $\frac{1}{4}$–$\frac{2}{3}$ in. long. Flowers in terminal oblong or ovoid heads continuous with the branch. Corolla-tube long and narrow; limb small.

Leaves densely imbricated, fleshy when fresh, erect or spreading, not keeled .. .. 76. *V. Haastii.*

Leaves densely imbricated, spreading and recurved, coriaceous, sharply keeled .. .. 77. *V. epacridea.*

Leaves not imbricated, spreading, oblong, flat. Bracts very numerous, crowded, linear .. .. 78. *V. Petriei.*

Section V. Small prostrate woody plants 2–6 in. long. Leaves closely quadrifariously imbricate, rigidly coriaceous, $\frac{1}{10}$–$\frac{1}{6}$ in. long. Flowers large, $\frac{1}{4}$–$\frac{1}{2}$ in. diam., solitary and terminal, pentamerous.

Branches $\frac{1}{8}$ in. diam. Leaves oblong-obovate, $\frac{1}{8}$–$\frac{1}{6}$ in. long. Calyx hispid below .. .. 79. *V. dasyphylla.*

Branches $\frac{1}{5}$ in. diam. Leaves oblong, $\frac{1}{10}$–$\frac{1}{8}$ in. long. Calyx hispid throughout. Ovary villous at the tip .. .. 80. *V. uniflora.*

H. scobi - thomsoni Allan 69: 274
H. Sinclairii S&T 70: 30
H. Rapidosa " 70: 31.
H. nemorosissima 72: 29.

SUBDIVISION B. Leaves crenate-toothed or serrate (obscurely toothed or entire in *V. erecta*).

* Flowers racemose.

Rigid, sparingly branched. Leaves ½–1 in., narrow-obovate. Racemes short, 5–8-flowered. Flowers 4-merous, large, white, ¾ in. diam. .. .. 81. *V. macrantha.*

Much branched. Leaves ½–1½ in., linear-oblong, margined with white down. Racemes long, many-flowered. Flowers 5-merous, bright-blue, ⅓–½ in. diam. .. .. .. 82. *V. Benthami.*

Sparingly branched, erect. Leaves ¾–1 in., oblong-lanceolate, entire or obscurely toothed. Racemes long, 3–4 in., strict. Flowers small, ⅕ in. diam. .. .. 83. *V. erecta.*

** Flowers sessile in branched panicles or corymbs.

Laxly branched, 1–3 ft. high. Leaves 1–2 in., broadly ovate. Panicle terminal, slender, much branched, 6–12 in. long. Flowers ¼ in. diam. .. .. 84. *V. Hulkeana.*

Decumbent below, 4–8 in. high, Leaves ½–1 in., broadly ovate. Flowers in a dense corymb 1–2 in. across .. .. 85. *V. Lavaudiana.*

Decumbent or erect, 4–12 in. high. Leaves ⅓–¾ in., oblong-spathulate. Flowers in lateral and terminal clusters, often forming a close terminal panicle .. .. .. 86. *V. Raoulii.*

DIVISION II, PYGMEA. *Capsule turgid, the septum across the broadest diameter. Small depressed pulvinate herbs. Leaves minute, densely imbricated all round the branches. Flowers solitary and terminal. Corolla-limb 5-lobed or rarely abnormally 6-lobed.*

Leaves ⅒ in., linear-oblong, margins and both surfaces above the middle hoary with long white hairs .. .. .. 87. *V. pulvinaris.*

Leaves ⅒–⅛ in., rhomboid-obovate, margins and back above the middle hispid, rarely almost glabrous .. .. 88. *V. Thomsoni.*

Leaves ⅛–⅙ in., broadly obovate-spathulate, coriaceous, margins ciliate with long stiff hairs, both surfaces glabrous 89. *V. ciliolata.*

DIVISION III, EUVERONICA. *Capsule laterally compressed, the septum across the narrowest diameter. Perennial herbs, sometimes woody at the base. Stems prostrate or decumbent or suberect. Leaves toothed or serrate, rarely entire. Flowers in axillary racemes or solitary. Corolla-tube short.*

* Flowers racemose.

Stems woody, much branched, 6–12 in. high; branches slender. Leaves ⅛–⅙ in., ovate-lanceolate, acute, entire or toothed. Racemes short, crowded at the tips of the branches .. .. 90. *V. loganioides.*

Stems procumbent and ascending, diffusely branched, 2–9 in. long. Leaves ⅓–1 in., linear, obtuse, entire .. .. 91. *V. linifolia.*

Stems prostrate below, erect above, simply or sparingly branched, 6–24 in. long. Leaves ½–4 in., lanceolate to ovate, serrate. Racemes 3–9 in. long .. .. .. 92. *V. catarractae.*

Stems prostrate and rooting, diffusely branched, 3–18 in. long. Leaves ¼–¾ in., ovate or oblong, serrate, glabrous. Racemes slender, glabrous or nearly so .. .. .. 93. *V. Lyallii.*

Stems prostrate and rooting, much branched, 3–10 in. long. Leaves minute, ⅒–¼ in., with 1 or 2 teeth on each side. Peduncle long, strict, erect .. .. .. 94. *V. Bidwillii.*

Stems stout, prostrate, 3–10 in. long. Leaves crowded, ¼–½ in., ovate, serrate, usually pubescent on both surfaces. Raceme very stout, densely glandular-pubescent, 4–8-flowered. Capsule broadly oblong .. .. .. 95. *V. Hookeriana.*

H. brockei S&T. 72: 29.
H. treadwellii Cockn. & Allan 56: 27.
H. allanii " 56: 25.
H. densiflora Benth. 1845. 98; 193, 1845.
H. planipetiolata S&T. 72: 3; 1943.
H. laxa " 32 & 73: 166

H. rakaiensis (L.B.A.) Cockayne Trans 60:1929:472
Arrowtown - Petrie 4 9:1917
= H. brachysiphon Summ. acc to H.H.A. but see Wall Rec. Cant Mus. 4:1935:97

Stems rather slender, prostrate, 3–6 in. long. Leaves $\frac{1}{4}$–$\frac{1}{2}$ in., ovate, serrate, glabrous. Racemes rather slender, pubescent, many-flowered. Capsule oblong	96.	*V. Olseni.*
Stems tufted and prostrate, much branched, 3–6 in. long. Leaves $\frac{1}{6}$–$\frac{1}{2}$ in., ovate- or deltoid-spathulate, crenate-lobed, glandular-pubescent; petioles long. Racemes very short	97.	*V. spathulata.*
Stems sparingly branched, decumbent at the base; branches few, glabrous below, pilose above. Leaves cuneate-obovate, 3–7-lobed. Flowers few, large, white, $\frac{1}{2}$–$\frac{3}{4}$ in. diam.	98.	*V. Birleyi.*
Stems prostrate, elongated, 1–3 ft. long. Leaves petiolate; lamina $\frac{1}{2}$–1 in., ovate-deltoid, coarsely toothed. Racemes lateral, short, 2–5 in. long	99.	*V. plebeia.*
Stems suberect, glabrous, 6–18 in. high. Leaves 1–3 in., linear-oblong, serrate, sessile. Racemes 4–10 in. long, many-flowered	100.	*V. Anagallis.*

** Flowers solitary.

Stems prostrate, 6–12 in. long; branchlets erect. Leaves $\frac{1}{6}$–$\frac{1}{3}$ in., oblong or obovate, toothed or entire. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. diam.	101.	*V. Muelleri.*
Densely tufted, forming rounded patches 2–5 in. across. Leaves $\frac{1}{3}$–$\frac{1}{2}$ in., narrow-obovate, coarsely toothed. Flowers $\frac{1}{8}$ in. diam. Calyx-segments toothed	102.	*V. Cheesemanii.*
Creeping, matted. Leaves minute, $\frac{1}{12}$–$\frac{1}{10}$ in., ovate, entire. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. diam.	103.	*V. canescens.*

Quite a considerable number of hybrid Veronicas are in cultivation either in New Zealand or in Great Britain; but so few observations of scientific value have been made upon them that I am unable to take up the matter here. I regret this, for it is quite possible that certain species included in this enumeration may prove to be of hybrid origin.

It is desirable to give the following information respecting certain doubtful plants:—

V. carnea J. B. Armstr. in Trans. N.Z. Inst. xiii (1881) 357 is a garden-plant of unknown origin, and has never been found in the wild state. It is probably a hybrid. *V. macrocalyx* and *V. rugulosella* Col. in Trans. N.Z. Inst. xxiv (1892) 391 and *V. oligantha* Col. *l.c.* xxv (1893) 333 are proved by the types in Mr. Colenso's herbarium to be nothing more than slight varieties of the naturalized *V. serpyllifolia* Linn. Similarly, *V. longiracemosa* Col. *l.c.* xx (1888) 203 and *V. hirsuta* Col. *l.c.* xxiv (1892) 393 are *V. arvensis* Linn.; and *V. areolata* Col. *l.c.* 392 is *V. persica* Poir (*V. Buxbaumii* Ten.), both species being now naturalized throughout the Dominion. In the absence of authentic specimens I have been unable to precisely identify *V. Rakaiensis* J. B. Armstr. *l.c.* xiii (1881) 356 and *V. polyphylla* Col. *l.c.* xxxi (1899) 277; but the first-mentioned is probably identical with my *Veronica Traversii* var. *elegans*. If it should be maintained as a distinct species, then Mr. Armstrong's name will take precedence.

1. **V. speciosa** *R. Cunn. in Bot. Mag.* (1836) sub. t. 3461.—A stout glabrous shrub 2–5 ft. high with numerous spreading leafy branches; branchlets thick, angled, $\frac{1}{4}$–$\frac{1}{3}$ in. diam. Leaves spreading, sessile or on very short thick petioles, 2–4 in. long, 1–1$\frac{3}{4}$ in. broad, obovate or obovate-oblong, rounded at the tip, truncate or slightly cordate at the base or narrowed into the petiole, thick and coriaceous, dark-green and glossy, midrib downy above, lateral veins obsolete, margins entire. Racemes axillary and opposite, near the tips of the branches, not much longer than the leaves, very stout and dense-flowered, sometimes exceeding 1$\frac{1}{2}$ in. diam.; rhachis puberulous; pedicels short, spreading. Flowers large, $\frac{1}{3}$ in. diam., dark reddish-purple or violet-purple. Calyx 4-partite; segments ovate, subacute or obtuse, ciliolate. Corolla-tube broad, funnel-shaped, $\frac{1}{2}$ as long again as the

H. imperialis (Bmch.) Ckn. Trans. 60:1929:471 = H. speciosa var imperialis Bmch in Fl. de Serres 22:+

calyx; limb 4-lobed; lobes oblong, obtuse, the dorsal lobe rather larger than the lateral, anterior the smallest. Capsule $\frac{1}{4}$–$\frac{1}{3}$ in. long, ovate, compressed, more than twice as long as the calyx.—*A. Cunn. Precur.* (1838) n. 373; *Raoul Choix* (1846) 43; *Hook. f. Fl. Nov. Zel.* i (1853) 191; *Handb. N.Z. Fl.* (1864) 206; *Bot. Mag.* (1844) t. 4057; *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 351. V. Kermesina *Loud. Encyc. Pl.* 1546.

Var. **brevifolia** (*Cheesem.*).—Leaves smaller and narrower, 1–2$\frac{1}{2}$ in. long by $\frac{1}{3}$–$\frac{3}{4}$ in. broad, oblong-obovate to linear-oblong, obtuse or subacute. Racemes and flowers smaller.

North Island: North Cape (var. *brevifolia*), *T. F. C.*; south head of Hokianga Harbour, *R. Cunningham, T. Kirk!* Maunganui Bluff, *Petrie!* Urenui (Taranaki), *T. F. C.*; Port Nicholson, *Lyall.* South Island: Marlborough—Ship Cove, *Lyall*; Pelorus Sound, *J. Rutland!* November–March.

A remarkably rare and local species, confined to cliffs near the sea. All the wild specimens that I have seen have the flowers dark reddish-purple, but in cultivation they frequently become violet-purple. It hybridizes freely with *V. salicifolia, macrocarpa, elliptica,* and probably other species, and several of the hybrids have become common garden-plants.

2. **V. Dieffenbachii** *Benth. in DC Prodr.* x (1846) 459.—A robust much-branched shrub; branches widely divaricating, 2–5 ft. long or more; branchlets stout, green, terete, $\frac{1}{6}$–$\frac{1}{4}$ in. diam., glabrous or puberulous. Leaves spreading, often recurved, sessile and semiamplexicaul, 2–4 in. long, $\frac{1}{2}$–1 in. broad, linear-oblong, rarely broader and almost oblong, acute or subacute, coriaceous or almost fleshy, pale-green, midrib stout, prominent beneath, lateral veins very indistinct, margins slightly recurved when fresh. Racemes pedunculate, suberect, exceeding the leaves, 2$\frac{1}{2}$–5 in. long, $\frac{3}{4}$–1 in. diam., dense-flowered; rhachis stout; pedicels spreading, $\frac{1}{10}$–$\frac{1}{8}$ in. long, with a minute subulate bract at the base. Flowers $\frac{1}{4}$ in. diam., usually lilac-purple. Calyx small, 4-partite; segments ovate-oblong or ovate-lanceolate, acute, ciliolate. Corolla-tube funnel-shaped, exceeding the calyx; limb 4-lobed; dorsal and lateral lobes broadly oblong, anterior narrower. Capsule $\frac{1}{5}$–$\frac{1}{4}$ in. long, ovate, acute, glabrous, about 2$\frac{1}{2}$ times as long as the calyx.—*Hook. f. Fl. Nov. Zel.* i (1853) 191; *Handb. N.Z. Fl.* (1864) 206; *Bot. Mag.* (1899) t. 7656; *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 531; *Gard. Chron.* ii (1898) 154, t. 41; *Cheesem. Man. N.Z. Fl.* (1906) 500. V. Forsteri *F. Muell. Veg. Chath. Is.* (1864) 46 (*in part*).

Chatham Islands: Apparently not uncommon, *Dieffenbach, H. H. Travers, J. D. Enys! F. A. D. Cox* and *Cockayne!*

In cultivation this puts out numerous stout almost horizontal branches close to the ground, so that a single plant occupies quite a large space without rising to a greater height than 3 or 4 ft.; but Dr. Cockayne informs me that this peculiarity is not so noticeable in the wild state. I am also indebted to him for a series of specimens showing a considerable range of variation in the size and shape of the leaves and their texture, the length of the raceme, size of the flowers, &c., apparently accompanied by slight differences in the mode of growth.

3. **V. Dorrien-Smithii** *Cockayne in Trans. N.Z. Inst.* xliv (1912) (*Proceedings*) 51.—A small sparingly branched straggling shrub; stems and branchlets slender, more or less hoary-pubescent, rarely almost glabrous. Leaves sessile and semiamplexicaul, very variable in size and shape, 2–3 in. long by $\frac{3}{4}$–1$\frac{1}{4}$ in. broad, oblong to elliptic-oblong or elliptic-lanceolate, pale-green, glabrous above, slightly pubescent beneath, margins ciliate, acute or subacute, rarely rounded at the tip. Racemes pedunculate,

equalling or exceeding the leaves; rhachis puberulous. Flowers $\frac{1}{5}$ in. diam., white or lavender fading to white. Calyx short, broad, deeply 4-partite; lobes broadly ovate, the margins ciliate. Corolla-tube funnel-shaped, exceeding the calyx; lobes obovate. Capsule broadly ovoid, twice as long as the calyx.

CHATHAM ISLANDS: Peaty ground at the margin of Lake Tekua Taupo. December–January.

Evidently a variable plant, differing greatly in habit and mode of growth, size and shape of the leaves and their density on the stem, compactness of the racemes, &c. Its nearest ally is undoubtedly *V. Dieffenbachii*; but, as Dr. Cockayne remarks, it "is a much smaller plant, and although the branches are straggling they are not widely divaricating. It differs also in the hoary pubescent more slender stems, broader light-green not whitish-green leaves, the very small bracteoles, and much shorter racemes."

4. **V. Barkeri** *Cockayne in Trans. N.Z. Inst.* xxxi (1899) 421.—A stout branching shrub; branches erect, not divaricating, terete, the younger ones brownish-purple. Leaves spreading, sessile, 2 in. long, $\frac{1}{3}$–$\frac{2}{3}$ in. broad, lanceolate or oblong-lanceolate, acute or subacute, narrowed towards the base, thick and fleshy, pale dull-green, midrib scarcely prominent beneath. Racemes opposite near the ends of the branches, about as long as the leaves, dense-flowered; rhachis and pedicels pubescent; bracts subulate, $\frac{1}{2}$ as long as the pedicels. Flowers $\frac{1}{5}$–$\frac{1}{4}$ in. diam., pale-lilac. Calyx small, deeply 4-partite; segments ovate-lanceolate, acute. Corolla-tube slightly longer than the calyx; limb spreading, 4-lobed; dorsal and lateral lobes sub-equal, broadly oblong, obtuse, anterior lobe smaller. Capsule $\frac{1}{6}$ in. long, ovate, acute; about twice as long as the calyx.—*Cheesem. Man. N.Z. Fl.* (1906) 500. T. 60 : 469.

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CHATHAM ISLANDS: *Barker, Cockayne!*

I fear that this is much too close to *V. Dieffenbachii*, but my specimens are very indifferent. According to Dr. Cockayne, it differs "in its erect not spreading habit, smaller leaves, shorter racemes, in its extremely pubescent style, and in the midrib not conspicuously raised."

5. **V. Adamsii** *Cheesem. n. sp.*—An erect branching shrub 2–5 ft. high; branchlets stout, terete, perfectly glabrous. Leaves spreading, sessile or nearly so, $1\frac{1}{2}$–3 in. long, $\frac{1}{2}$–$\frac{2}{3}$ in. broad, lanceolate to oblong-lanceolate, broad at the base and almost semiamplexicaul, gradually tapering from the middle to an acute or subacute tip, somewhat thick and coriaceous, midrib evident on both surfaces, perfectly glabrous, margins slightly thickened. Racemes near the tips of the branches, longer than the leaves, $1\frac{1}{2}$–$3\frac{1}{2}$ in. long, $\frac{3}{4}$ in. broad; bracts, rhachis, and pedicels perfectly glabrous. Flowers rather large, $\frac{1}{3}$ in. diam., purple. Calyx deeply 4-partite; segments equalling the corolla-tube. Corolla-lobes broadly ovate, obtuse; anterior rather narrower than the dorsal. Capsule $\frac{1}{4}$ in. long, broadly ovoid, acute.

NORTH ISLAND: North Cape district, open hillsides by the road between Spirits Bay and Tom Bowline's Bay, not uncommon, *Adams* and *T. F. C.*, January, 1896. January–February.

Probably nearest to *V. Bollonsii*, but differing in being quite glabrous, in the leaves being lanceolate, tapering to a subacute tip, and with a much broader almost semi-amplexicaul base, and in the flowers being purple. The semiamplexicaul leaves show an affinity to *V. Dieffenbachii*.

6. **V. Bollonsii** *Cockayne in Trans. N.Z. Inst.* xliv (1912) (*Proceedings*) 50.—A small much-branched erect shrub 3–5 ft. high or more; branchlets stout, erect, glabrous or slightly puberulous. Leaves variable in size, 1–3 in. long or more, $\frac{1}{2}$–$\frac{3}{4}$ in. broad, obovate-oblong to elliptic-oblong, obtuse with a minute apiculus or subacute, smooth and shining, subcoriaceous, glabrous or nearly so; margins thickened, finely ciliate towards the base. Racemes longer than the leaves, 2–4 in. long, $\frac{3}{4}$–1 in. broad, many-flowered but flowers somewhat laxly placed; bracts, rhachis, and pedicels finely pubescent. Flowers rather large, $\frac{1}{3}$ in. diam., pale-lilac. Calyx deeply 4-partite; segments almost as long as the corolla-tube. Corolla-lobes ovate, obtuse or subacute. Capsule about $\frac{1}{4}$ in. long, broadly ovoid, acute.

North Island: Poor Knights Islands, *Cockayne!* Mokohinou Islands, *K. H. Shakespeare!* Hen and Chickens Islands, *T. F. C.* February–May.

This is probably nearest to *V. macroura*, from which it differs in the firmer and more coriaceous glossy foliage, and in the larger flowers, which are more laxly placed. I found it to be a very abundant species on the Hen and Chickens Islands when I first visited the group in May, 1880.

7. **V. obtusata** *Cheesem. in Trans. N.Z. Inst.* xlviii (1916) 213.—A branching shrub 2–3 ft. high; branches spreading or procumbent, the younger ones terete, at first pubescent, but at length becoming nearly glabrous. Leaves sessile or very shortly petiolate, 1–2 in. long, $\frac{3}{5}$–1 in. broad, oblong to elliptic-oblong or obovate-oblong, obtuse or subacute, subcoriaceous, flat, margins edged with a line of short and dense white hairs, midrib occasionally downy. Racemes longer than the leaves, $1\frac{1}{2}$–$2\frac{1}{2}$ in. long, straight or curved, dense-flowered, but not so much so as in *V. macroura;* rhachis and pedicels densely pubescent. Flowers $\frac{1}{5}$ in. diam., pale bluish-white. Calyx 4-partite; segments oblong or ovate-oblong, obtuse or subacute; margins conspicuously ciliate with soft whitish hairs. Corolla-tube exceeding the calyx; limb 4-lobed. Capsule $\frac{1}{5}$ in. long, ovate, compressed, not twice as long as the calyx.—V. macroura *Hook. f. var.* dubia *Cheesem. Man. N.Z. Fl.* (1906) 501.

North Island: Sea-cliffs on the coast north of the Manukau Harbour, *T. F. C.* February–March.

In the first edition of this work I treated this as a variety of *V. macroura*. But it is much smaller, and has a much more diffuse mode of growth; the leaves are smaller, broader, and more obtuse, and the margins have a dense edging of short white hairs. The racemes are smaller and shorter in proportion; the flowers are not so dense and are slightly larger; and the calyx-segments have their margins ciliate with white hairs. It may prove to be nearer to my *V. divergens*, which, however, is much more glabrous.

8. **V. macroura** *Hook. f. ex Benth. in DC. Prodr.* x (1846) 549.—A much-branched glabrous shrub 1–5 ft. high; branches rather stout, spreading, terete. Leaves spreading, sessile or very shortly petiolate, 1–3 in. long, $\frac{1}{2}$–$1\frac{1}{4}$ in. broad, obovate-oblong to obovate-lanceolate or linear-oblong, obtuse or acute, hardly coriaceous, flat, glabrous or the margins minutely pubescent. Racemes longer than the leaves, 2–4 in. long, $\frac{1}{2}$–$\frac{3}{4}$ in. diam., often curved, very densely many-flowered; rhachis and pedicels finely pubescent, the latter slender, spreading or subsecund, often pendulous in fruit. Flowers small, densely compacted, $\frac{1}{8}$–$\frac{1}{6}$ in. diam., white or pale bluish-white. Calyx deeply 4-partite; segments narrow-oblong, acute,

finely pubescent, margins ciliolate. Corolla-tube slender, exceeding the calyx; limb small, with narrow-oblong obtuse lobes. Capsules densely crowded, usually pendulous, small, ovate, compressed, $\frac{1}{8}$–$\frac{1}{6}$ in. long, scarcely twice as long as the calyx.—*Hook. f. Fl. Nov. Zel.* i (1853) 191; *Handb. N.Z. Fl.* (1864) 207; *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 351; *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 531; *Cheesem. Man. N.Z. Fl.* (1906) 501. see Wall Rec. Canl. Mus. 4: 1935: 97

North Island: Hicks Bay, and southwards to Gisborne and Mahia Peninsula, not uncommon along the shores, *Colenso! Bishop Williams! H. Hill! W. Townson!* Portland Island, *Bishop Williams!* Cape Turnagain, *Colenso! B. C. Aston!* January–February.

I now restrict this species to the typical plant, as described above. It is best recognized by the dense curved racemes, small flowers, narrow corolla-lobes, and small densely compacted capsules. It is a purely littoral plant, and is never seen far from the sea. It is recorded from Whangarei in the Handbook, on the authority of Colenso, but Mr. N. E. Brown informs me that there are no specimens at Kew from him with that locality.

9. **V. Cookiana** *Col. in Trans. N.Z. Inst.* xx (1888) 201.—A much-branched shrub 2–4 ft. high; branches stout, coarsely divided, glabrous or the young ones minutely pubescent. Leaves broadly oblong, 2–4 in. long, $1\frac{1}{4}$–2 in. broad, abruptly narrowed near the apex into a short blunt point, broad and nearly sessile at the base, subcoriaceous, flat, margins faintly thickened and copiously pubescent, midrib usually puberulous beneath; petioles short and broad, often slightly winged at the base, margins hairy. Racemes towards the tips of the branches, longer than the leaves, 3–6 in. long, $\frac{3}{4}$ in. diam. or more, very densely many-flowered; rhachis and pedicels coarsely pubescent. Flowers small, very densely crowded, $\frac{1}{8}$ in. diam., white with a pale-violet tinge. Calyx deeply partite, segments coarsely pubescent. Corolla-tube barely exceeding the calyx. Capsules densely crowded, often pendulous, small, ovate, subcompressed, apiculate, slightly exceeding the calyx.—V. macroura *var.* Cookiana *Cheesem. Man. N.Z. Fl.* (1906) 501.

North Island: Sea-cliffs near Table Cape, near Mahia Peninsula, *H. Hill!* January–February.

No doubt closely allied to *V. macroura*, but much stouter, and with a coarser habit of growth. The leaves are larger and broader at the base, and the petioles are very short, expanded at the base and almost connate, while the calyx is much more pubescent.

10. **V. divergens** *Cheesem. Man. N.Z. Fl.* (1906) 502.—A much-branched shrub 2–5 ft. high; branches stout, spreading, the younger ones puberulous. Leaves spreading, sessile or very shortly petiolate, $\frac{3}{4}$–$1\frac{1}{4}$ in. long, $\frac{1}{4}$–$\frac{1}{2}$ in. broad, oblong or linear-oblong to elliptic-oblong or -ovate, acute or obtuse, narrowed at the base, flat, coriaceous, quite glabrous, midrib distinct on both surfaces, margins entire. Racemes axillary and opposite near the tips of the branches, stout, peduncled, 2–3 in. long or more, dense-flowered; rhachis pubescent; pedicels as long as the calyx; bracts equalling the pedicels or rather shorter. Flowers $\frac{1}{5}$–$\frac{1}{4}$ in. diam., white. Calyx 4-partite; segments oblong-ovate, obtuse or acute, margins ciliolate. Corolla-tube short and broad, not exceeding the calyx; limb longer than the tube, 4-lobed; lobes broadly oblong, obtuse, the anterior one narrower. Stamens exserted. Capsule $\frac{1}{6}$ in. long, broadly elliptic-oblong, subacute, compressed, glabrous, twice as long as the calyx.

South Island: Nelson—Coast near Brighton, to the south of Westport, *W. Townson!*

Although unwilling to create new species in a genus like *Veronica*, I feel compelled to assign specific rank to this, which appears to be well characterized by the small oblong or elliptic-oblong flat spreading leaves, dense racemes, very short and broad corolla-tube, and broadly oblong subacute capsule. It is difficult to trace its relationships, but I think its nearest allies will be found in the vicinity of *V. macroura* on one side, and *V. ligustrifolia* on the other.

11. **V. ligustrifolia** *A. Cunn. in Bot. Mag.* (1836) sub. t. 3461. — A small laxly branched glabrous shrub 1–3 ft. high, rarely more; bark greyish-brown; branchlets slender, twiggy, terete. Leaves spreading, sessile or nearly so, 1–2 in. long, rarely more, $\frac{1}{4}$–$\frac{1}{2}$ in. broad, oblong or linear-oblong to oblong-lanceolate, obtuse or subacute or more rarely acute, flat, quite entire. Racemes near the tips of the branches, 2–3 in. long, slender, rather lax-flowered; rhachis, pedicels, and bracts puberulous or almost glabrate. Flowers rather small, white, $\frac{1}{5}$–$\frac{1}{4}$ in. diam. Calyx deeply 4-partite; segments ovate-lanceolate, acute, glabrous or the margins minutely ciliolate. Corolla-tube funnel-shaped, shorter than the calyx; limb longer than the tube, spreading, 4-lobed; lobes acute. Capsule $\frac{1}{5}$ in. long, ovate, acute, compressed, hardly twice as long as the calyx.—*A. Cunn. Precur.* (1838) n. 375; *Benth. in DC. Prodr.* x (1846) 460; *Raoul Choix* (1846) 43; *Hook. f. Fl. Nov. Zel.* i (1853) 192; *Handb. N.Z. Fl.* (1864) 208 (*in part only*); *Cheesem. Man. N.Z. Fl.* (1906) 208.

North Island: North Cape district, *Adams* and *T. F. C.*; Bay of Islands, *A. Cunningham, Colenso!* and others; Whangarei Heads, *T. F. C.*

The plant herein described is the original *V. ligustrifolia* of A. Cunningham, and of Bentham in De Candolle's Prodromus. It by no means corresponds with the *ligustrifolia* of Hooker, who included in the term Bentham's *V. acutiflora* and my *leiophylla*, and possibly other plants. As a species it comes nearest to *V. salicifolia*, differing in the smaller size, paler bark, and more twiggy habit, in the much smaller and more obtuse leaves, in the lax-flowered racemes, in the acute and almost glabrous calyx-segments, and in the short broad tube of the corolla and its acute spreading lobes. I am indebted to Mr. N. E. Brown for comparing my North Cape specimens with Cunningham's type.

12. **V. pubescens** *Banks and Sol. ex Benth. in DC. Prodr.* x (1846) 460.—A slender diffusely branched shrub 4–6 ft. high; branches terete, the younger ones villous with soft spreading white hairs. Leaves spreading or suberect, shortly petiolate, 1$\frac{1}{2}$–3 in. long, $\frac{1}{3}$–$\frac{2}{3}$ in. broad, oblong-lanceolate or lanceolate, acute, narrowed towards the base, quite entire, midrib and margins and the whole of the under-surface villous with short soft white hairs. Racemes axillary, 2–4 in. long, $\frac{1}{2}$ in. diam., rather slender, many-flowered; rhachis, pedicels, and calyx densely villous. Flowers small, $\frac{1}{8}$–$\frac{1}{6}$ in. diam. Calyx 4-partite; segments oblong-lanceolate, acute. Corolla-tube slender, longer than the calyx; limb with 4 rather narrow oblong lobes. Capsule ovate, acute, glabrous, nearly twice as long as the calyx.—*Hook. f. Fl. Nov. Zel.* i (1853) 193; *Handb. N.Z. Fl.* (1864) 208; *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 351; *Cheesem. Man. N.Z. Fl.* (1906) 503; *Adamson in Journ. Linn. Soc.* xl (1912) 252.

North Island: Auckland—Mercury Bay, *Banks* and *Solander*; Shoe Island (off Tairua Harbour) and Cabbage Bay, *Adams!*

Very near to *V. salicifolia* var. *stricta*, but at once separated by the copious hairs on the young shoots, margins and midribs of the leaves, and inflorescence. Mr. N. E. Brown informs me that Mr. Adams's specimens correspond precisely with Banks and Solander's type. Both Bentham and Hooker describe the plant as being "everywhere covered with red-brown hairs," but on the upper surface of the leaves the hairs are confined to the midrib and margins.

13. **V. breviracemosa** *W. R. B. Oliver in Trans. N.Z. Inst.* xlii (1910) 170. —A slender, glabrous, sparingly branched shrub 3–5 ft. high; branchlets green, angled, faintly puberulous. Leaves spreading, sessile and almost semiamplexicaul at the base, 3–5 in. long, $\frac{3}{4}$–$1\frac{1}{4}$ in. broad, elliptic-oblong or elliptic-lanceolate, acute, thin and membranous, quite entire, glabrous or the margins finely ciliate at the very base. Racemes 2–3 in. long, shorter than the leaves, densely flowered; rhachis and pedicels pubescent. Calyx deeply 4-partite; segments lanceolate, acuminate, more or less pubescent. Corolla 4-partite, slightly exceeding the calyx; tube short, about $\frac{1}{2}$ the length of the calyx-segments. Capsule ovoid, acute, $\frac{1}{2}$ as long again as the calyx.

KERMADEC ISLANDS: Cliffs on the eastern coast of Sunday Island, *T. F. C.*; cliffs in Denham Bay and inland, *W. R. B. Oliver!*

This is nearest to *V. salicifolia*, from which it differs mainly in its much broader and thinner leaves, the racemes shorter than the leaves, and in the calyx-segments being not much shorter than the capsule. It is removed from *V. macrocarpa* by the much thinner leaves and much smaller capsules.

14. **V. salicifolia** *Forst. f. Prodr.* (1786) n. 11. — An erect much-branched shrub 5–12 ft. high; branchlets slender, terete, glabrous or the younger ones minutely pubescent. Leaves pale-green or yellowish-green, sessile or nearly so, very variable in size, 2–6 in. long, $\frac{1}{3}$–$\frac{3}{4}$ in. broad, lanceolate or linear-lanceolate to oblong-lanceolate, usually narrowed towards the base, but sometimes broad and somewhat amplexicaul, narrowed towards the apex and drawn out into a long acuminate point, thin and membranous, entire or with a few obscure incisions, glabrous or sparingly pubescent on the midrib and margins; margins flat, midrib usually prominent beneath, especially towards the base of the leaf. Racemes slender, longer than the leaves, 3–6 in. long, very many-flowered; rhachis, pedicels, and bracts pubescent or almost glabrate; pedicels slender, variable in length. Flowers $\frac{1}{8}$–$\frac{1}{6}$ in. diam., white with a pale-lilac tinge, rarely quite white. Calyx 4-partite; segments lanceolate to ovate-lanceolate, acute, glabrous or more or less pubescent. Corolla-tube funnel-shaped, $\frac{1}{2}$ as long again as the calyx. Capsule $\frac{1}{8}$–$\frac{1}{5}$ in. long, broadly ovate, acute, compressed, from $\frac{1}{2}$ as long again to twice as long as the calyx.—*A. Rich. Fl. Nouv. Zel.* (1832) 1869; *A. Cunn. Precur.* (1838) n. 374; *Benth. in DC. Prodr.* x (1846) 459; *Raoul Choix* (1846) 43; *Hook. f. Fl. Nov. Zel.* i (1853) 191; *Handb. N.Z. Fl.* (1864) 207; *Cheesem. Man. N.Z. Fl.* (1906) 504; *Adamson in Journ. Linn. Soc.* xl (1912) 252. A. salicifolia *var.* communis *Cockayne in Trans. N.Z. Inst.* xlviii (1916) 201. V. Lindleyana *Paxt. Mag. Bot.* xii (1846) 247. V. Parkinsoniana *Col. in Trans. N.Z. Inst.* xxi (1889) 97.

Var. **stricta** *Hook. f. Fl. Nov. Zel.* i (1853) 191.—Racemes, pedicels, and calyx-segments much more hairy, sometimes almost villous. Capsules smaller, more acute. —V. stricta *Banks and Sol. ex Benth. in DC. Prodr.* x. (1846) 97.

Var. **longiracemosa** *Cockayne in Trans. N.Z. Inst.* xlix (1917) 61.—Racemes much longer, sometimes over 12 in.; rhachis, pedicels, and calyx much more pilose; leaves longer. Otherwise as in the type.

Var. **paludosa** *Cockayne in Trans. N.Z. Inst.* xlviii (1916) 201.—Leaves narrow linear-lanceolate, long acuminate. A very distinct looking variety.—V. longiracemosa *Petrie in Trans. N.Z. Inst.* xlix (1917) 52 *and* V. salicifolia *var.* Egmontiana *Cockayne ined.* appear to be the same.

Var. **Atkinsoni** *Cockayne in Trans. N.Z. Inst.* xlviii (1916) 200.—Prostrate or erect. Leaves pale-green, rather thick, ¾–1½ in. long, oblong or ovate-oblong. Racemes short, 1½–3 in., obtuse, dense-flowered. Flowers white.

Var. **Kirkii** *Cheesem. Man. N.Z. Fl.* (1906) 504.—A shrub 4–12 ft. high; branches robust, dark-brown. Leaves small, ¾–1½ in., oblong or oblong-lanceolate, coriaceous. Racemes 4–8 in. long. Flowers white.—V. Kirkii *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 356.

North and South Islands: The typical state abundant throughout the South Island, from sea-level to 3500 ft. In the North Island stretching as far north as the East Cape, Taranaki, and the central volcanic plateau, and possibly extending still farther to the north. Var. *stricta:* The common variety in the North Island, stretching from the North Cape southwards to Hawke's Bay and Taranaki, and in all probability reaching Cook Strait. Var. *longiracemosa:* Waitakerei Range, near Auckland, *T. F. C.;* Egmont–Wanganui district, *Cockayne!* Taranaki, *T. F. C., W. W. Smith!* vicinity of Wanganui, *A. Allison!* Waimarino Plateau, *T. F. C., Spencer!* Hawke's Bay, *Colenso!* Var. *paludosa:* North Island: Subalpine scrub on Mount Egmont (sub nomine var. *Egmontiana*), *Cockayne!* South Island: Lake Ianthe, Westland, *Cockayne!* Awatere Valley, *H. J. Matthews ex Petrie!* (sub nomine *V. longiracemosa*). Var. *Atkinsoni:* Shores of Cook Strait and vicinity, abundant, *Buchanan! T. Kirk! Cockayne! B. C. Aston!* and many others. Marlborough—The sounds and eastward to the mouth of the Awatere River, *Cockayne! J. H. Macmahon!* Var. *Kirkii:* Canterbury—Upper Rangitata Valley, *J. B. Armstrong!* Mount Arrowsmith, *Cockayne;* Peel Forest and Orari Gorge, *H. H. Allan!*

The most widely distributed of the New Zealand species, and one of the most variable. In addition to the varieties characterized above, the student will find numerous forms which appear to connect it with *V. macroura, Dieffenbachii, macrocarpa, ligustrifolia,* and others. In cultivation it hybridizes freely with most of the allied species, and several of the hybrids are now common in gardens, especially *V. Andersoni (Lindl. and Paxt. Flow. Gard.* ii, 3), the result of a cross with *V. speciosa.*

15. **V. gigantea** *Cockayne in Trans. N.Z. Inst.* xxxiv (1902) 319.—A small round-headed forest-tree 20–30 ft. high or even more; trunk distinct, erect, 1–1½ ft. diam., bark brown; branches numerous, glabrous when mature; branchlets slender, terete. Leaves of adult trees very similar to those of *V. salicifolia,* 2–5 in. long, ⅓–½ in. broad, lanceolate to linear-lanceolate, acute, sessile at the base, scarcely keeled, dull-green; leaves of juvenile plants coarsely toothed, their margins ciliate with minute hooked hairs. Inflorescence very similar to that of *V. salicifolia;* but the racemes usually shorter than the leaves or barely equalling them. Flowers usually white, ⅙–⅕ in. diam. Corolla-tube short, hardly longer than the calyx.—V. salicifolia *var.* gigantea *Cheesem. Man. N.Z. Fl.* (1906) 504.

Chatham Islands: Not uncommon in forest districts, *Cockayne! F. A. D. Cox!* November–December.

In the mature stage this only differs from *V. salicifolia* in forming a tree which occasionally reaches a height of 40 ft., with a stout and evident trunk; whereas *V. salicifolia* is always shrubby, with a thin slender stem. According to Dr. Cockayne, there are also important differences between the juvenile leaves of the two species. I regret that my specimens are very indifferent; and the above description will probably require amendment when a better series is obtained.

16. **V. rotundata** *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 530.—A laxly branched shrub 2–6 ft. high; branches terete, glabrous. Leaves spreading, sessile or very shortly petioled, 3–4 in. long by ¾–1¼ in. broad, oblong-lanceolate or elliptic-lanceolate, subacute, hardly coriaceous, flat, veins obscure. Racemes usually longer than the leaves, 3–6 in. long, 1 in. diam., densely many-flowered; rhachis and pedicels puberulous.

[*V. myrtifolia* B.t.S. ex Benth. in DC Prod. 10:1846:460.
part of macrocarpa see C+A. p.20.
H. myrtifolia ( ) Cockn. Trans 60:1929:472

Flowers large, ¼ in. diam., violet-purple or lilac. Calyx 4-partite; segments oblong-ovate, acute or subacute. Corolla-tube short and broad, hardly equalling the spreading 4-lobed limb. Stamens long, far-exserted. Capsule about ⅕ in. long, suborbicular, compressed, obtuse, about twice as long as the calyx.—*Cheesem. Man. N.Z. Fl.* (1906) 504.

North Island: Vicinity of Wellington, *T. Kirk!* South Island: Canterbury—Southbridge, *T. Kirk!* July–September.

Nearest to *V. macrocarpa*, but separated from it, and from all the large-leaved species, by the almost orbicular capsule rounded at the tip. The leaves are also broader and more obtuse than in any of the forms of *V. macrocarpa*. This is probably a garden-plant of hybrid origin, as suggested by Dr. Cockayne (Trans. N.Z. Inst. xlix (1917) 61.

17. **V. macrocarpa** *Vahl Symb. Bot.* iii (1794) 4.—An erect branching shrub 4–8 ft. high; branchlets rather stout, terete, glabrous. Leaves sessile or very shortly petioled, spreading, 3–6 in. long, ½–1 in. broad, narrow oblong-lanceolate to lanceolate or linear-lanceolate, acute, rather coriaceous, dark-green, smooth and glabrous, flat, veins obscure. Racemes usually rather longer than the leaves, 3–7 in. long, many-flowered, cylindrical, acute, sometimes attenuate at the tip; rhachis and pedicels glabrate or puberulous. Flowers large, white, ¼–⅓ in. diam. or even more. Calyx 4-partite; segments oblong, obtuse, ciliolate. Corolla-tube broad, about twice as long as the calyx; limb 4-lobed; lobes oblong, obtuse. Stamens very long, far-exserted. Capsule large, ¼–⅓ in. long, ovate, compressed, acute, three times as long as the calyx.—*A. Cunn. Precur.* (1838) n. 376; *Raoul Choix* (1846) 43; *Hook. f. Fl. Nov. Zel.* i (1853) 192; *Handb. N.Z. Fl.* (1864) 207; *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 351; *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 529; *Cheesem. Man. N.Z. Fl.* (1906) 505.

Var. **latisepala** *Cheesem.*—Habit and foliage of the type, but racemes usually shorter than the leaves; flowers and capsules often secund. Calyx-segments rather broader. Flowers deep-violet.—V. latisepala *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 530.

Var. **affinis** *Cheesem.*—Leaves smaller, 2–4 in. long. Racemes shorter, 3–5 in.; flowers smaller, white. Capsules ⅕–¼ in., twice as long as the calyx. Apparently a passage-form into *V. salicifolia*. × *H. affinis* (*Cheesem.*) C+A.

North Island: From Hokianga and Mangonui southwards to Poverty Bay and Taranaki, not uncommon. South Island: Queen Charlotte Sound, *Banks* and *Solander*. Var. *latisepala*: Great and Little Barrier Islands, Whangarei Heads, *T. Kirk! Miss Shakespear! T. F. C.* Var. *affinis*: Headlands in the Waitemata and Manukau Harbours and the adjacent coasts, *T. F. C.* Sea-level to 2000 ft. August–November.

The typical state of this, with large somewhat coriaceous leaves, long racemes of large white flowers, and very large acute capsules, is a most striking plant, and can be recognized at a glance. But there are many intermediates between it and *V. salicifolia* which are difficult to place, and the one which I have called var. *affinis* might be referred to either species. Mr. Kirk's *V. latisepala*, which I have had repeated opportunities of studying at the Little Barrier Island, does not differ from the type except in the violet flowers and shorter often secund racemes, and is best treated as a variety.

18. **V. Townsoni** *Cheesem. in Trans. N.Z. Inst.* xlv (1913) 95.—A branching shrub 3–6 ft. high or more; branchlets stout, rigid, glabrous, ringed with the scars of the fallen leaves. Leaves sessile or very shortly petiolate, spreading, 2–3 in. long, ¼–⅓ in. broad, linear-lanceolate, acute, very thick and coriaceous, rigid when dry, glabrous, flat and smooth above,

midrib elevated beneath, veins obscure. Racemes usually longer than the leaves, 3–6 in. long, lax-flowered, often attenuated towards the tip, glabrate or nearly so. Flowers about $\frac{1}{4}$ in. diam. Calyx 4-partite, segments oblong-ovate to oblong-lanceolate, acute or subacute, margins ciliolate. Corolla-tube short and broad, hardly exceeding the calyx; limb 4-lobed; lobes oblong, obtuse. Capsule $\frac{1}{5}$–$\frac{1}{4}$ in. long, ovate, acute, compressed, about twice as long as the calyx.—V. macrocarpa *var.* crassifolia *Cheesem. Man. N.Z. Fl.* (1906) 505.

South Island: Rocky hills between the Little Wanganui and Mokihinui Rivers, north of Westport; and on limestone rocks by Fox's River, near Brighton; *W. Townson!* January–February. *Tr. Nelsonian Trans 75:192*

This is a perfectly distinct species, distinguished from all the forms of *V. macrocarpa* by the smaller and narrower much more coriaceous and rigid leaves, by the acute calyx-segments, by the very short and broad corolla-tube, which is hardly longer than the calyx, whereas in *V. macrocarpa* it is quite twice the length, and by the capsule not being more than twice the length of the calyx-segments.

It is worth mention that on the under-surface of the leaves, just within the margin, there is a row of small pits, or "domatia," somewhat similar to those which exist on the under-side of the various species of *Coprosma*, where, however, they are found in the axils formed by the junction of the main veins with the midrib. These pits appear to be inhabited by small *Acari*, as in *Coprosma*.

19. **V. amabilis** *Cheesem. Man. N.Z. Fl.* (1906) 506.—A tall branching shrub 6–15 ft. high or even more; branches rather slender, terete, quite glabrous or the younger ones minutely puberulous. Leaves spreading, shortly petiolate, 2–4 in. long, $\frac{2}{3}$–1 in. broad, oblong-lanceolate or elliptic-lanceolate, acute or acuminate, firm but hardly coriaceous, flat, smooth and glabrous, midrib obscurely puberulous above, margins entire. Racemes axillary and opposite near the tips of the branches, 4–6 in. long, slender, lax-flowered, usually attenuate at the tip; pedicels slender, the lower ones often $\frac{1}{3}$ in. long or more. Flowers large, $\frac{1}{3}$ in. diam., white. Calyx deeply 4-partite; segments ovate or ovate-lanceolate, acute, ciliolate. Corolla-tube short and broad, equalling the calyx or rather longer than it; limb 4-lobed; lobes oblong, obtuse. Capsule $\frac{1}{4}$ in. long, ovate, acute, twice as long as the calyx.—V. salicifolia *var.* gracilis *T. Kirk Forest Fl.* (1889) t. 120.

Var. **blanda** *Cheesem.*—Apparently a closely branched shrub. Leaves rather close-set, spreading, often distinctly petiolate, 1–2½ in. long, $\frac{1}{2}$–$\frac{3}{4}$ in. broad, elliptic-lanceolate or linear-oblong, acute or acuminate, coriaceous, flat, glabrous or puberulous on the margins and midrib above; margins thickened, entire or remotely notched. Racemes 2–3 in. long, often 1 in. broad, dense- or lax-flowered. Flowers large, white, $\frac{1}{4}$–$\frac{1}{3}$ in. diam. Calyx-segments acute. Ripe capsules not seen.

South Island: Otago—Bluff Hill, *T. Kirk!* Var. *blanda:* Port Chalmers, *Petrie!* Preservation Inlet, *T. Kirk!* Resolution Island, Dusky Sound, *B. C. Aston!* Stewart Island: Port William, *Lyall;* Paterson's Inlet, *Thomson!* Mason Bay, *Cockayne!* Ruapuke Island, *H. J. Matthews!*

The plant from the Bluff Hill, which I have taken for the type of the species, was referred by Mr. Kirk to *V. salicifolia*, from which it appears to me to differ altogether in the broader and shorter leaves, more lax-flowered racemes, longer pedicels, much larger flowers, acute calyx-segments, shorter and broader corolla-tube, and larger capsule. It is much nearer *V. macrocarpa*, but the leaves are shorter and broader, the racemes laxer, and the calyx-segments acute. Var. *blanda* has still shorter and broader leaves, with the margins often thickened and peculiarly notched, and the racemes are shorter and denser, but the flowers are very similar. Mr. N. E. Brown informs me that Lyall's Port William specimens, mentioned in the Handbook under *V. macrocarpa* and *V. ligustrifolia*, are both referable to it.

H. corrigani, Cass Trans 60:573

H.

20. **V. Lewisii** *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 357. — A handsome closely branched erect shrub 3–6 ft. high; branches stout, terete, clothed with short and fine greyish-white pubescence. Leaves pale-green, spreading, shortly petiolate, 1½–2½ in. long, ¾–1 in. broad, oblong or elliptic-oblong, acute or subacute, rounded or truncate or subcordate at the base, coriaceous, glabrous above, midrib often puberulous beneath, margins edged with a soft white pubescent line. Racemes near the tips of the branches, short and stout, 2–2½ in. long, 1 in. diam., dense-flowered; rhachis, pedicels, and bracts finely pubescent. Flowers large, ⅓ in. diam. or even more, pale-blue. Calyx 4-partite; segments ovate-oblong, acute, ciliolate. Corolla with a short and broad funnel-shaped tube and large spreading 4-lobed limb; dorsal and lateral lobes subequal, anterior rather smaller. Capsule ¼ in. long, ovate, acute, compressed, about twice as long as the calyx. — *Cheesem. Man. N.Z. Fl.* (1906) 506. Wall nec Cant. 4: 1935: 98

South Island: Canterbury—Downs near the sea in the south of the province, *J. B. Armstrong!* near Timaru, *Buchanan!*

Easily distinguished by the softly pubescent branches, pale-green leaves with a pubescent margin, and short broad racemes with very large flowers. Although I have seen specimens said to have been collected near the sea in the vicinity of Timaru, I am somewhat doubtful as to their origin, and suspect some mistake. It is commonly cultivated in gardens, and may be of hybrid origin.

p. 22.

21. **V. chathamica** *Buch. in Trans. N.Z. Inst.* vii (1875) 338, t. 13, f. 1.—A prostrate or trailing shrub, with much-branched stems 6–18 in. long; branches numerous, terete, sparingly softly pubescent or almost glabrous. Leaves usually close-set, spreading, sessile or very shortly petiolate, ½–1 in. long, elliptic or elliptic-oblong, obtuse or subacute, flat, subcoriaceous, glabrous or nearly so. Racemes several towards the tips of the branches, peduncled; flowering portion ½–1 in. long and almost as broad, broadly oblong, obtuse, dense-flowered; rhachis, pedicels, and bracts pubescent, the latter equalling or exceeding the pedicels. Flowers ⅕–¼ in. diam., purple. Calyx deeply 4-partite; segments ovate-lanceolate, acute. Corolla-tube short, not much longer than the calyx; limb 4-lobed; dorsal and lateral lobes nearly equal, anterior smaller. Capsule about ⅕ in. long, ovate, subacute, compressed, about twice as long as the calyx.—*J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 351; *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 528; *Cheesem. Man. N.Z. Fl.* (1906) 507. H. coxiana See Trans. 60: 1929: 470

Var. **Coxiana** *Cheesem.* — Branches stouter, suberect. Leaves rather larger and more distant, 1–1½ in. long, obovate-oblong or elliptical, rounded at the apex, almost membranous, softly pubescent on both surfaces. Corolla-tube rather longer. — V. Coxiana *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 529.

Chatham Islands: Not uncommon on rocks near the sea, *H. H. Travers! F. A. D. Cox! Cockayne!*

A well-marked species, easily recognized by the trailing or prostrate habit and short broad very obtuse racemes. Mr. Kirk distinguished his *V. Coxiana* mainly by the softer and more herbaceous habit and more pubescent leaves and branches, characters which entirely break down when a large suite of specimens is examined.

T. 69: 277

22. **V. acutiflora** *Benth. in DC. Prodr.* x (1846) 460. — A small erect sparingly branched shrub; branches slender, terete, glabrous or the ultimate ones very minutely puberulous. Leaves sessile, spreading, 2–3 in. long, ⅙–¼ in. broad, linear-lanceolate, narrowed to an obtuse tip,

flat or nearly so, quite smooth and glabrous or the midrib puberulous above, margins entire. Racemes opposite and axillary near the tips of the branches, 2–4 in. long, slender, lax-flowered; rhachis, pedicels, and bracts pubescent or glabrate; pedicels slender, the lowest $\frac{1}{6}$ in. long. Flowers $\frac{1}{6}$–$\frac{1}{5}$ in. diam. Calyx deeply 4-partite; segments long, ovate-lanceolate, acute, pubescent or glabrate. Corolla-tube funnel-shaped, short and broad, not nearly equalling the calyx; limb deeply 4-lobed; lobes longer than the tube, oblong, acute or subacute. Capsule $\frac{1}{6}$ in. long, ovate-oblong, acute, about twice as long as the calyx.—*Cheesem. Man. N.Z. Fl.* (1906) 507. V. ligustrifolia *var.* acutiflora *Hook. f. Fl. Nov. Zel.* i (1853) 192.

NORTH ISLAND: Auckland—Kerikeri Falls (Bay of Islands), *A. Cunningham, Colenso! T. Kirk! Petrie!* February–March.

This appears to be a variable plant. Mr. Colenso's specimens have the pedicels and calyces nearly glabrate; in Kirk's and Petrie's they are softly pubescent. So far as is known, the species is restricted to a single habitat, where it was originally discovered by Allan Cunningham.

23. **V. angustifolia** *A. Rich. Fl. Nouv. Zel.* (1832) 187.—An erect much-branched glabrous shrub 5–8 ft. high; branches slender, erect, naked below, bark often purplish-brown. Leaves sessile, spreading or deflexed, $1\frac{1}{2}$–$3\frac{1}{2}$ in. long, $\frac{1}{6}$–$\frac{1}{4}$ in. broad, narrow-linear or narrow linear-lanceolate, often falcate, acute, dark-green and channelled above, paler and keeled beneath, quite glabrous, margins entire. Racemes numerous near the tips of the branches, opposite and axillary, erect or spreading, longer than the leaves, 2–5 in. long, slender, tapering, usually rather lax-flowered; rhachis, pedicels, and bracts pubescent; pedicels short, slender. Flowers rather small, $\frac{1}{6}$ in. diam., pale-lilac. Calyx very small, deeply 4-partite; segments oblong, obtuse, ciliate. Corolla-tube tubular, 2 or 3 times as long as the calyx; limb 4-lobed; lobes broadly oblong, obtuse. Capsule about $\frac{1}{6}$ in. long, ovate, acute, compressed, about twice as long as the calyx.—*Raoul Choix* (1846) 43; *Cheesem. Man. N.Z. Fl.* (1906) 508. V. squalida *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 528. V. parviflora *var.* angustifolia *Hook. f. in Bot. Mag.* (1872) t. 5965.

Var. **abbreviata** *Petrie in Trans. N.Z. Inst.* liii (1921) 371.—Racemes shorter than the leaves, $\frac{3}{4}$–$1\frac{1}{2}$ in. long, obtuse, densely many-flowered; leaves somewhat shorter than in the type. Capsules not seen.

NORTH ISLAND: Auckland—Near Gisborne, *W. Townson!* Hawke's Bay—*Colenso! H. Hill!* Ruahine Mountains, *B. C. Aston.* Wellington—River-beds of Wangaehu and Turakina, *A. Allison!* SOUTH ISLAND: Nelson and Marlborough, abundant, *D'Urville, Travers! Buchanan! T. Kirk! J. H. Macmahon! T. F. C.*, and others; Buller Gorge, *Petrie.* Var. *abbreviata:* Marlborough—Valley of the Ure River, *B. C. Aston!* Sea-level to 3500 ft. December–February.

Very near to *V. parviflora*, and chiefly separated by the smaller size, longer and often drooping leaves, longer and more lax-flowered racemes, and longer corolla-tube. Hooker's plate in the *Botanical Magazine* is excellent.

24. **V. parviflora** *Vahl Symb. Bot.* iii (1794) 4.—A much-branched shrub or small tree 6–20 ft. high, with a rounded dome-shaped head; trunk sometimes 2 ft. diam. at the base; branches slender, twiggy, ringed with the scars of the fallen leaves. Leaves sessile, spreading or suberect, 1–$2\frac{1}{2}$ in. long, $\frac{1}{6}$–$\frac{1}{4}$ in. broad, narrow linear-lanceolate, acute, almost flat or channelled above, keeled beneath, quite smooth, margins

entire. Racemes near the tips of the branches, 1–3 in. long, equalling the leaves or only slightly longer than them, dense-flowered; rhachis, pedicels, and bracts pubescent; pedicels short, rather stout. Flowers small, $\frac{1}{6}$ in. diam., white with a lilac tinge. Calyx short and broad, deeply 4-partite; segments broadly oblong, obtuse, ciliate. Corolla-tube funnel-shaped, about $\frac{1}{2}$ as long again as the calyx, seldom more; limb 4-lobed; lobes about as long as the tube, broadly oblong or almost orbicular, obtuse. Capsule about $\frac{1}{6}$ in. long, ovate, acute, about twice as long as the calyx.—*A. Cunn. Precur.* (1838) n. 378; *Raoul Choix* (1846) 43; *Hook. f. Fl. Nov. Zel.* i (1853) 192; *Handb. N.Z. Fl.* (1864) 207 (*in part only*); *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 351; *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 526; *Cheesem. Man. N.Z. Fl.* (1906) 508; *Adamson in Journ. Linn. Soc.* xl (1912) 254. V. stenophylla *Steud. Nom. Bot.* ed. ii, 760. V. arborea *Buch. in Trans. N.Z. Inst.* vi (1874) 242.

North Island: Auckland—Whangarei Heads and Taranga Islands, *T. F. C.*; Great Barrier Island, *T. Kirk!* East Cape district, *T. Kirk.* Hawke's Bay, *Colenso!* Wellington—Cape Terawhiti and hills near Wellington, *Buchanan! T. Kirk!* South Island: Marlborough—Queen Charlotte Sound, *Banks* and *Solander.* December–February. Sea-level to 2000 ft.

There is some little doubt as to the plant that Vahl described as *V. parviflora*, but it is probably identical with the *V. floribunda* of Banks and Solander's manuscripts and the *V. arborea* of Buchanan. It is chiefly characterized by its large size—sometimes considerably over 25 ft.—small linear-lanceolate leaves, small dense racemes usually not much exceeding the leaves, and short and broad corolla-tube. In the Flora and in the Handbook it is united with *V. angustifolia* A. Rich, which I take to be quite distinct.

25. **V. leiophylla** *Cheesem. Man. N.Z. Fl.* (1906) 509. — A large spreading perfectly glabrous shrub 4–12 ft. high; branches terete. Leaves spreading, sessile or very shortly petiolate, $\frac{3}{4}$–$1\frac{1}{4}$ in. long, $\frac{1}{5}$–$\frac{1}{3}$ in. broad, linear-oblong or narrow oblong-lanceolate, obtuse or acute, flat, smooth, coriaceous, glabrous or the midrib obscurely puberulous above. Racemes towards the tips of the branches, much longer than the leaves, 2–4 in. long, slender; rhachis, pedicels, and bracts puberulous; pedicels longer than the calyx. Flowers rather densely placed, $\frac{1}{6}$–$\frac{1}{5}$ in. diam. by $\frac{1}{4}$ in. long or more. Calyx small, 4-partite; segments oblong, obtuse. Corolla-tube about twice as long as the calyx; limb equalling or shorter than the tube, 4-lobed; lobes oblong, obtuse, the anterior one rather narrower. Capsule $\frac{1}{5}$ in. long, broadly oblong, subacute, compressed, glabrous, nearly three times as long as the calyx.—*Ill. N.Z. Fl.* ii (1914) t. 149. V. parviflora *var.* phillyreaefolia *Hook. f. Fl. Nov. Zel.* i (1853) 192.

South Island: Apparently not uncommon throughout, from Nelson to Otago. Sea-level to 3000 ft. December–February.

This appears to me to be a perfectly distinct species, easily distinguished from *V. parviflora*, under which it was placed by Hooker, by the flat linear-oblong usually obtuse leaves and much larger flowers and capsules. I suspect that Kirk's *V. parviflora* var. *strictissima*, of which I have only seen two immature specimens, is simply a state with more acute leaves and strict suberect racemes. It is frequently named *V. Traversii* in gardens, but is altogether unlike what I take to be the typical state of that species.

26. **V. gracillima** *Cheesem. Man. N.Z. Fl.* (1906) 510. — A much-branched glabrous shrub; branches spreading, terete. Leaves spreading, sessile or nearly so, 1–$2\frac{1}{2}$ in. long, $\frac{1}{5}$–$\frac{1}{3}$ in. broad, linear-lanceolate or lanceolate, gradually tapering to an acute or acuminate apex, flat, coriaceous,

glabrous or puberulous on the midrib above. Racemes numerous towards the tips of the branches, exceeding the leaves, 3–5 in. long, slender; rhachis, pedicels, and bracts puberulous; pedicels slender, longer or shorter than the calyx. Flowers rather densely placed, large, $\frac{1}{5}$–$\frac{1}{4}$ in. diam. by almost $\frac{1}{3}$ in. long. Calyx 4-partite; segments oblong-ovate, subacute or obtuse, ciliolate. Corolla-tube funnel-shaped, shorter than the limb and often barely exceeding the calyx; limb large, 4-lobed; dorsal and lateral lobes about equal, oblong, obtuse; anterior lobe narrow, linear-oblong, acute. Capsule $\frac{1}{5}$ in. long, broadly oblong, acute, compressed, glabrous, more than double the length of the calyx.—V. ligustrifolia *var.* gracillima *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 527.

South Island: Nelson—Abundant in the vicinity of Westport, *Dr. Gaze! W. Townson!*

This differs from *V. acutiflora* in the larger size, longer and more dense-flowered racemes, and especially in the short obtuse or subacute calyx-segments, which are altogether unlike the lanceolate acute or acuminate calyx-segments of *acutiflora*. It agrees with *acutiflora* in the short corolla-tube and large deeply divided limb. From *V. parviflora* it is at once separated by the larger flowers and differently shaped corolla.

27. **V. insularis** *Cheesem. in. Trans. N.Z. Inst.* xxix (1897) 392.—A small erect or decumbent robust shrub 1–3 ft. high; branches stout, spreading, ringed with the scars of the fallen leaves, pubescent towards the tips. Leaves close-set, spreading or suberect, sessile or very shortly petiolate, $\frac{3}{4}$–$1\frac{1}{4}$ in. long, $\frac{1}{3}$–$\frac{1}{2}$ in. broad, elliptic-oblong or oblong-obovate, subacute or obtusely mucronate, quite entire, very coriaceous, flat or slightly keeled, often glaucous, midrib prominent beneath, margins thickened. Racemes corymbosely branched, peduncled, $\frac{3}{4}$–$1\frac{1}{2}$ in. long, many-flowered, in opposite pairs near the tips of the branches; rhachis and pedicels puberulous; bracts rather large. Flowers $\frac{1}{4}$ in. diam., pale lavender-blue. Calyx short and broad, 4-partite; segments broadly ovate, acute, ciliolate. Corolla-tube broad, about $\frac{1}{2}$ as long again as the calyx; limb 4-lobed. Capsule ovoid, turgid, acute, rather more than twice as long as the calyx.—*Man. N.Z. Fl.* (1906) 510.

North Island: Three Kings Islands, rocky places on both the Great King and the Western King, but not common, *T. F. C.* November–December.

This has the corymbose inflorescence of *V. diosmaefolia*, but differs altogether in the stout spreading or decumbent habit, much larger broader leaves, and in the calyx and corolla.

28. **V. venustula** *Col. in Trans. N.Z. Inst.* xxvii (1895) 393.—A small compact bushy shrub 6–9 in. high; branchlets short, numerous. Leaves close-set, decussate, spreading, shortly petiolate, $\frac{1}{2}$–$\frac{3}{4}$ in. long, $\frac{1}{4}$ in. broad, oblong or elliptic-ovate, acute, coriaceous, flat or slightly concave, not keeled, dark-green and glabrous; midrib prominent beneath, excurrent; margins entire. Racemes terminal, much branched, forming a terminal many-flowered corymb 2 in. diam.; pedicels slender, puberulous; bracts lanceolate, acute, equalling the pedicels. Flowers white, $\frac{1}{4}$–$\frac{1}{3}$ in. diam. Calyx deeply 4-partite; segments ovate or ovate-lanceolate, acute. Corolla-tube funnel-shaped, rather longer than the calyx; limb 4-lobed; lobes subequal, broadly ovate, obtuse. Capsule $\frac{1}{4}$ in. long, broadly ellipsoid, obtuse, more than twice as long as the calyx.—*Cheesem. Man. N.Z. Fl.* (1906) 511.

H. trisepala (Col.) Cku. Trans. 60:1929:472

H. diosm. var. vernalis Cheesm 60:306

North Island: Hawke's Bay—Eastern side of the Ruahine Range, County of Waipawa, *A. Olsen!*

Of this species I have only seen two small scraps, but these both agree in the very distinct character of the inflorescence, which forms a dense terminal corymb similar to that of *V. diosmaefolia*, from which plant it differs totally in the leaves, calyx, and corolla. Mr. N. E. Brown, who has examined some specimens forwarded to Kew by Colenso, also states that it is "a very distinct species near to *V. diosmaefolia*." It is curious that so far it has escaped the notice of any collector except Mr. Olsen.

29. **V. diosmaefolia** *R. Cunn. in Bot. Mag.* (1836) sub. t. 3461.—A small much-branched shrub, usually from 2–5 ft. high, but sometimes attaining a height of 15 ft., with a slender trunk 4–6 in. diam.; branches glabrous or puberulous, ringed with the scars of the fallen leaves. Leaves close-set, spreading or suberect, shortly petioled, ½–1 in. long, ⅛–⅙ in. broad, linear-oblong or oblong-lanceolate to elliptic-oblong, straight or slightly falcate, acute, entire or with 2–4 minute incisions on each side near the apex, coriaceous, dark-green above, paler and often slightly keeled by the midrib beneath, veinless. Racemes about 1 in. long, peduncled, corymbosely branched, usually near the tips of the branches, but sometimes lateral; rhachis and pedicels slender, puberulous; bracts shorter than the pedicels. Flowers about ¼ in. diam., white or pale lavender-blue. Calyx usually 3-partite with the upper segment broader and 2-fid, rarely equally 4-partite. Corolla-tube short, funnel-shaped, not much longer than the calyx; limb 4-lobed, the posticous lobe the largest. Capsule ⅙ in. long, ovoid, turgid, about twice as long as the calyx.—*A. Cunn. Precur.* (1838) 381; *Raoul Choix* (1846) 43; *Hook. f. Fl. Nov. Zel.* i (1853) 193; *Handb. N.Z. Fl.* (1864) 209; *J. B. Armstr. in. Trans. N.Z. Inst.* xiii (1881) 351; *Cheesem. Man. N.Z. Fl.* (1906) 511. V. diosmaefolia *var.* trisepala *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 525; *Hook. f. Bot. Mag.* (1897) t. 7539. V. trisepala *Col. in Trans. N.Z. Inst.* xv (1883) 324. T. 60:472.

North Island: Auckland—In various localities from the North Cape to Whangarei, but far from common. Hawke's Bay—North end of Te Kaweka Mountain, *A. Hamilton!*

The distinguishing characters of this well-known species are the narrow acute leaves, truly corymbose inflorescence, usually 3-partite calyx with obtuse segments, and comparatively short corolla-tube. Its nearest ally is *V. Menziesii*, which is separated mainly by the equally 4-partite calyx with acute segments, long corolla-tube, and larger capsules. Mr. Kirk has divided it into 2 varieties; one, which he considered to be the typical state, with rather broader and shorter entire leaves and a 4-partite calyx; the other, which answers to the *V. trisepala* of Colenso, and which he called var. *trisepala*, with narrower incised leaves and a 3-partite calyx. But entire or incised leaves occur in both forms, so that the difference between the two varieties really consists in the number of calyx-segments alone, or rather in the extent to which the two upper sepals are united. It seems hardly worth while keeping up a distinction founded on such a slight character, but if it is retained the form with a 3-partite calyx should be considered as the type, seeing that it extends through the whole range of the species, whereas the form with the calyx 4-partite is rare in the wild state. Cunningham does not mention the number of calyx-segments in the original description, but both Bentham (*DC. Prodr.* x (1846) 460) and Hooker (*Fl. Nov. Zel.* i (1853) 193) give the number as 3.

H. menziesii Benth in Trans with Syn. 73:163. 75:193.

30. **V. Menziesii** *Benth. in DC. Prodr.* x (1846) 461.—A compact perfectly glabrous shrub 3–12 ft. high; branches terete, leafy. Leaves usually rather close-set, shortly petiolate, suberect or spreading, ½–1 in. long, ⅕–¼ in. broad, lanceolate to elliptic-lanceolate or linear-oblong, acute, rigid, coriaceous, flat or slightly keeled beneath. Racemes crowded near the tips of the branches, 1–2 in. long, peduncled, corymbosely branched, very rarely simple, erect or erecto-patent; rhachis slender, puberulous; pedicels variable in length.

H. subsolida S.+T. Trans 73:163

Flowers white or pale-lilac, $\frac{1}{5}$–$\frac{1}{4}$ in. diam. Calyx deeply 4-partite; segments ovate-oblong, subacute or obtuse, ciliolate. Corolla-tube nearly twice as long as the calyx, funnel-shaped; lobes oblong, obtuse or subacute, the anterior one narrower than the rest. Capsule ovoid, acute, more than twice as long as the calyx.—*Hook. f. Fl. Nov. Zel.* i (1853) 193; *Cheesem. Man. N.Z. Fl.* (1906) 512. V. Colensoi *Hook. f. Handb. N.Z. Fl.* (1864) 209 (*in part only*).

Var. **divaricata** (*Cheesem.*).—More sparingly branched; the branches slender, spreading. Leaves narrower, lanceolate, acute, often falcate, spreading or deflexed, not so closely placed nor so coriaceous as in the type. Racemes copiously corymbosely branched. Calyx-segments narrower, ovate-lanceolate, acute. Has much of the habit and general appearance of *V. diosmaefolia*, but differs markedly in the longer corolla-tube and narrower acute calyx-segments.

South Island: Marlborough—Pelorus and Tinline Valleys, *J. H. Macmahon! Cockayne;* Clarence Valley, *T. Kirk!* Nelson—Vicinity of Nelson, *Bidwill! B. C. Aston!* Maitai Valley, *T. Kirk! T. F. C.;* Lake Rotoiti, *Monro, T. F. C.;* Mount Mantell, Buller Valley, *H. H. Allan!* Canterbury—Hanmer Plains, *T. F. C.* Otago—Dusky Bay, *Menzies.* Sea-level to 3000 ft. December–February. Var. *divaricata:* Not uncommon in the Pelorus and Rai Valleys, Marlborough, *J. H. Macmahon!*

V. Menziesii was founded by Bentham on specimens collected by Menzies in Dusky Bay in 1791. In the Flora Hooker united Menzies's plant with another gathered by Bidwill in the vicinity of Nelson; but in the Handbook he referred Menzies's specimens to *V. elliptica*, and associated Bidwill's specimens with a plant gathered on the Ruahine Mountains by Colenso, and with others collected in various localities in the South Island by Sinclair, Travers, and Haast, giving the name of *Colensoi* to the species thus described. But as Colenso's plant was described as having simple racemes and glaucous leaves, while Bidwill's (judging from a specimen in my possession) had compound racemes and dark-green leaves, this arrangement did not appear at all satisfactory. At my request Mr. N. E. Brown has carefully examined the types in the Kew Herbarium, and reports that Menzies's and Bidwill's specimens undoubtedly belong to one and the same species, and that Hooker was in error in referring the former to *V. elliptica.* He further states that Colenso's Ruahine Mountain plant is totally different, and is the species subsequently described by Colenso under the name of *V. Hillii.* Under these circumstances, the name of *V. Menziesii* must be restored, the species being characterized by the narrow acute rigid leaves, corymbosely branched racemes, 4-partite calyx with subacute segments, and a corolla-tube almost twice as long as the calyx. Its nearest ally is *V. diosmaefolia*, to which my var. *divaricata* is very close indeed. A plant collected by Petrie at the foot of Ruapehu, and by Messrs. Hill and Andrew on the Ruahine Range, is doubtfully referred to *V. Menziesii* for the present, but the specimens are not sufficient for precise determination.

31. **V. Colensoi** *Hook. f. Handb. N.Z. Fl.* (1864) 209 (*as regards the North Island specimens only*).—A small erect or spreading perfectly glabrous shrub 9–18 in. high; branches leafy above, ringed with the scars of the fallen leaves below. Leaves rather close-set, suberect or spreading, sessile or narrowed into a very short broad petiole, $\frac{3}{4}$–$1\frac{1}{2}$ in. long, $\frac{1}{5}$–$\frac{1}{2}$ in. broad, linear-oblong or oblong-lanceolate, acute or subacute, entire or remotely incised, coriaceous, flat or nearly so, dark-green above, glaucous beneath; midrib stout, prominent beneath. Racemes few near the tips of the branches, slightly exceeding the leaves, slender, peduncled, simple or sparingly branched, many-flowered; rhachis slender, puberulous or glabrate; bracts exceeding the short pedicels. Flowers white, $\frac{1}{4}$ in. diam. Calyx deeply 4-partite; segments ovate-lanceolate, acute. Corolla-tube broadly funnel-shaped, shorter than the calyx; limb rather longer than the tube, 4-lobed; lobes spreading or reflexed, narrow-ovate, subacute. Stamens short, not exceeding the corolla-lobes. Capsule narrow-ovate, acute, compressed, about twice as long as the calyx.—*Cheesem. Man. N.Z. Fl.* (1906) 513. V. Hillii *Col. in Trans. N.Z. Inst.* xxviii (1896) 606; *T. Kirk l.c.* 524.

North Island: Hawke's Bay and Wellington—By the Ngaruroro River at Kuripapango, between the Rangitikei and Erewhon, *H. Hill!* *A. Hamilton!* *Petrie!* Ruahine Mountains, *Colenso!* *B. C. Aston!* 1500–3000 ft.

The *V. Colensoi* of the Handbook, as already stated, was based upon a mixture consisting of specimens collected on the Ruahine Mountians by Colenso, on *V. Menziesii*, and two or three other species. If the name is to be retained at all, it should clearly be restricted to Colenso's plant, which Mr. N. E. Brown informs me is identical with that subsequently described by Colenso under the name of *V. Hillii*. It can be distinguished by the small size, glaucous leaves, slender simple or sparingly branched racemes, narrow acute calyx-segments, and short corolla-tube. The *V. Colensoi* of the *Botanical Magazine* (t. 7296) is quite a different plant, but I have seen no specimens, and it does not seem to be known except in cultivation in England.

32. **V. rigidula** *Cheesem. Man. N.Z. Fl.* (1906) 514. — A small much-branched erect perfectly glabrous shrub 6–24 in. high, rarely more; branches stout, erect, scarred, almost black, leafy at the tips. Leaves close-set, almost imbricating, suberect or rarely spreading, petiolate, ½–¾ in. long, ⅙–¼ in. broad, linear-oblong or narrow obovate-oblong, acute or subacute, very thick and coriaceous, rigid, dark-green and concave above, glaucous and keeled by the thick and prominent midrib beneath; margins thickened, entire. Racemes or spikes 2–4 near the tips of the branches, about equalling the leaves, usually branched, dense-flowered; rhachis stout, pubescent; pedicels wanting or the lower flowers very shortly stalked; bracts ovate-oblong, obtuse, almost as long as the calyx. Flowers small, white, ⅕ in. diam. Calyx 4-partite; segments oblong, obtuse, ciliolate. Corolla-tube tubular, nearly twice as long as the calyx; limb rather short, not equalling the tube; lobes subequal, oblong, obtuse. Stamens slightly exceeding the corolla. Capsule small, ⅛–⅙ in. long, ovoid-oblong, acute or subacute, barely twice as long as the calyx.—*Ill. N.Z. Fl.* ii (1914) t. 150.

South Island: Marlborough—Pelorus and Rai Valleys, on rocks by the side of streams; Mount Duppa, Maungatapu, *J. H. Macmahon!* Pelorus Sound, *Cockayne*, *J. H. Macmahon*. Nelson—Wairau Gorge, *T. F. C.* Sea-level to 4000 ft. December–February.

Apparently a very distinct little plant. It has somewhat of the habit and general appearance of the *V. Colensoi* of this work (*V. Hillii* Colenso), but in reality differs altogether in the smaller and closer-set petiolate suberect keeled leaves, shorter and stouter dense-flowered racemes, smaller flowers, obtuse calyx-segments, and longer corolla-tube with a shorter limb.

33. **V. rupicola** *Cheesem. Man. N.Z. Fl.* (1906) 514.—An erect sparingly branched shrub 1–4 ft. high; branches stout, erect or spreading, glabrous or the younger ones faintly bifariously pubescent. Leaves not very close-set, spreading, petiolate, ½–1 in. long, ¼–⅓ in. broad, linear-oblong or elliptic-oblong or linear-obovate, obtuse or subacute, gradually narrowed into the rather long petiole, flat or slightly concave, coriaceous, glaucous when fresh, quite entire, midrib prominent beneath. Racemes or spikes lateral or towards the tips of the branches, much exceeding the leaves, 1–2 in. long, peduncled, usually trichotomous, very rarely simple; rhachis stout, strict, puberulous or almost glabrate; pedicels wanting or the lower flowers alone shortly stalked; bracts oblong-ovate, obtuse, large, often exceeding the calyx. Flowers crowded on the branches of the raceme, about ¼ in. diam. Calyx 4-partite; segments oblong, obtuse, with pale membranous ciliolate margins. Corolla-tube about ½ as long again as the calyx; limb equalling the tube or nearly so; lobes oblong-ovate, obtuse or subacute. Capsule broadly oblong, obtuse or subacute, about ¼ in. long, not twice the length of the calyx.

SOUTH ISLAND: Marlborough—Awatere Valley, *Sinclair!* Kaikoura Mountains, *Buchanan!* Hell's Gates, *H. J. Matthews*; gorge of the Conway River, Mount Fyffe, *Cockayne!* Nelson—Wairau Gorge, *T. F. C.*; Tarndale, Hanmer River, *Cockayne.* 1000–3000 ft.

A well-marked plant, easily recognized by the peculiar habit, spreading and long-petioled linear-obovate glaucous leaves, trichotomous racemes much longer than the leaves, almost sessile flowers, and large bracts. Its nearest ally is probably *V. Colensoi.*

34. **V. laevis** (*Benth. in DC Prodr.* x (1846) 461.—A small perfectly glabrous densely branched shrub 1–5 ft. high; branches stout, erect, densely leafy above, below ringed with the scars of the fallen leaves; bark black. Leaves decussate, close-set, erect and appressed, rarely farther apart and spreading, $\frac{1}{3}$–$\frac{2}{3}$ in. long, $\frac{1}{5}$–$\frac{1}{3}$ in. broad, ovate-oblong or obovate-oblong, obtuse or acute or apiculate, abruptly narrowed into a short thick petiole, very thick and coriaceous, rigid, concave above, keeled at the back; midrib stout, prominent beneath, usually excurrent at the tip; margins entire. Racemes 2–4 near the ends of the branchlets, corymbosely branched, rarely simple, $\frac{3}{4}$–$1\frac{1}{2}$ in. long, dense-flowered; rhachis stout, pubescent; bracts small, oblong-ovate, coriaceous, usually exceeding the lower pedicels. Flowers white, $\frac{1}{5}$–$\frac{1}{4}$ in. diam. Calyx deeply 4-partite; segments oblong or oblong-ovate, obtuse. Corolla-tube rather broad, less than twice as long as the calyx; segments oblong or oblong-ovate, obtuse. Capsule ovate or ovate-oblong, acute, about twice as long as the calyx.—*Hook f. Fl. Nov. Zel.* i (1853) 194; *Handb. N.Z. Fl.* (1864) 209; *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 351; *Cheesem. Man. N.Z. Fl.* (1906) 515. (?) V. azurea *Col. in Trans. N.Z. Inst.* xxxi (1899) 277.

NORTH ISLAND: Mount Hikurangi, *Adams* and *Petrie!* Mount Egmont, *T. F. C., Buchanan!* Tongariro, *Bidwill, G. Mair! T. F. C., Cockayne,* &c.; volcanic plateau around Tongariro and Ruapehu, *Colenso, T. Kirk! T. F. C., Cockayne, Petrie!* &c. Ruahine and Kaimanawa Mountains, *Colenso, H. Hill! Petrie, B. C. Aston!* Mount Holdsworth, *W. Townson!* Tararua Mountains, *Buchanan! Petrie.* SOUTH ISLAND: Marlborough—Mount Duppa, *J. H. Macmahon!* 2500–5000 ft. December–February.

The typical state of this is distinguished by the close-set imbricating and more or less appressed leaves, which are keeled at the back, but not truncate or subcordate at the base as in *V. buxifolia,* and by the usually corymbosely branched racemes. This latter peculiarity, Mr. N. E. Brown assures me, is well shown by the type specimens at Kew. It has been recorded from many districts in the South Island, from Nelson to Otago, but I have not seen any specimens that satisfactorily match those from the North Island. Most are referable to Armstrong's *V. monticola,* which is a larger plant, with larger laxer foliage, and longer always simple racemes. Others correspond with the *V. Cockayniana* of this work, which has flatter and more obtuse glaucous leaves, black when dry, simple very pubescent racemes, and larger flowers. States of *V. Traversii,* with more closely placed leaves than usual, have also had the name of *V. laevis* applied to them.

35. **V. elliptica** (*Forst. f. Prodr.* (1786) n. 10.—A copiously branched shrub or small tree 5–20 ft. high; branches terete, ringed with the scars of the fallen leaves, the younger ones more or less hoary with short soft white hairs, which are often arranged in two opposite lines. Leaves petiolate, close-set, horizontally spreading, uniform, $\frac{1}{2}$–$1\frac{1}{4}$ in. long, $\frac{1}{4}$–$\frac{1}{2}$ in. broad, elliptic-oblong or obovate-oblong, apiculate, slightly truncate at the base, pale-green, coriaceous, nerveless, margins edged with a white pubescent line, midrib prominent beneath; petioles short, erect and appressed to the branch. Racemes numerous near the tips of the branches, short, 1–$1\frac{1}{2}$ in. long, erect, glabrous or nearly so, laxly 4–12-flowered;

pedicels slender, each with a small lanceolate bract at the base. Flowers large, $\frac{1}{3}$–$\frac{2}{3}$ in. diam., white or white with purple lines, sweet-scented. Calyx $\frac{1}{8}$–$\frac{1}{6}$ in. long, 4-partite; segments ovate, acute or acuminate. Corolla-tube slightly longer than the calyx; limb large, 4-lobed; lobes spreading, ovate. Capsule $\frac{1}{4}$ in. long, broadly ovate, acute, twice as long as the calyx.—*A. Rich. Fl. Nouv. Zel.* (1832) 189; *A. Cunn. Precur.* (1838) n. 379; *Raoul Choix* (1846) 43; *Hook. f. Fl. Antarct.* i (1844) 58; *Fl. Nov. Zel.* i (1853) 193; *Handb. N.Z. Fl.* (1864) 209; *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 351; *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 526; *Cheesem. Man. N.Z. Fl.* (1906) 516. V. decussata *Ait. Hort. Kew.* i (1789) 20; *Bot. Mag.* (1794) t. 242.

North Island: Taranaki—Shores of Cape Egmont, *P. G. Morgan.* Wellington—Titahi Bay, near Cape Terawhiti, *B. C. Aston! Cockayne.* South Island: Western coast from West Wanganui and Cape Foulwind southwards, not uncommon; east and southern coasts of Otago, and islands in Foveaux Strait. Chatham Islands: *H. H. Travers! G. Mair!* Stewart Island and The Snares: Not uncommon on the coasts. Auckland and Campbell Islands: Abundant on the shore, *Hooker* and others. December–January.

A most distinct species, easily recognized by the pale-green elliptic apiculate petiolate leaves, and large white or blueish-white flowers. It is also a native of the Falkland Islands, Fuegia, and South Chile, and is the only shrubby species found in New Zealand that extends beyond the Dominion.

36. **V. Matthewsii** *Cheesem. Man. N.Z. Fl.* (1906) 517.—An erect glabrous shrub 2–4 ft. high or more; branches stout, terete, often purplish-red when young. Leaves close-set, sessile, suberect or spreading, $\frac{3}{4}$–$1\frac{1}{2}$ in. long, $\frac{1}{3}$–$\frac{2}{3}$ in. broad, oblong or elliptic-oblong, obtuse or subacute, rounded at the base, thick and coriaceous, flat, quite entire. Racemes near the tips of the branches or rarely lateral, large, 2–4 in. long including the stout naked peduncle, obtuse or tapering, densely many-flowered; rhachis stout, pubescent; pedicels very short, stout; bracts ovate or ovate-lanceolate, acute or obtuse. Flowers large, $\frac{1}{4}$–$\frac{1}{3}$ in. diam. or more, white or purplish. Calyx deeply 4-partite; segments oblong or oblong-ovate, obtuse, often with purplish margins. Corolla-tube twice as long as the calyx; limb spreading, 4-lobed; lobes subequal, broadly oblong, rounded at the tip. Ovary pubescent at the tip. Capsule $\frac{1}{4}$ in. long, elliptic-oblong, obtuse or subacute, about twice as long as the calyx.—*Ill. N.Z. Fl.* ii (1914) t. 151.

South Island: Canterbury—Southern Alps, *Haast! J. B. Armstrong!* Otago—Milford Sound, *J. D. Enys!* Humboldt Mountains, *H. J. Matthews!*

A handsome plant, often cultivated in gardens in the South Island as a variety of *V. Traversii*, but a much stouter plant with a different habit of growth, and with thicker and more coriaceous oblong leaves, and larger and stouter racemes with much larger flowers. It is nearer to *V. Balfouriana*, but that species has smaller leaves, acute calyx-segments, and a corolla-tube hardly longer than the calyx.

37. **V. Carsei** *Petrie in Trans. N.Z. Inst.* lv (1924) 96.—An erect glabrous shrub 2–6 ft. high, rarely more; branches slender, virgate, suberect or spreading, terete, marked with the scars of the fallen leaves; bark dark-brown or on the younger branchlets almost black. Leaves close-set, sessile or shortly petiolate, suberect or spreading, $\frac{3}{4}$–$1\frac{1}{4}$ in. long, $\frac{1}{4}$–$\frac{1}{2}$ in. broad, elliptic-oblong to lanceolate, acute or subacute, coriaceous, quite entire, flat above, midrib prominent beneath. Racemes long and slender, from near the base of the last year's shoots, 2–3 in. long including

the bare naked peduncle, erect or erecto-patent, many-flowered; pedicels about as long as the bracts; faintly puberulous. Calyx deeply 4-partite; segments ovate, acute, margins ciliate. Corolla-tube nearly twice as long as the calyx; limb spreading, 4-lobed, lobes nearly equal. Ripe capsules not seen.

North Island: Central volcanic plateau, from the Waimarino Plain to the base of Ruapehu, not uncommon near the outskirts of the forest.—*T. F. C., W. Townson! Cockayne! H. Carse! H. B. Matthews!* 3000–4500 ft.

A very puzzling plant. In the absence of a good series of specimens I placed it in the first edition of this work under *V. laevis*, but I am now convinced that this view is erroneous. The long racemes, often more than 3 in. long, with the large flowers (¼–⅓ in.) show a relationship to *V. Matthewsii*.

See Trans 60:1929:468

38. **V. Balfouriana** *Hook. f. Bot. Mag.* (1879) t. 7556.—"An erect glabrous shrub 3 ft. high, with dark-brown bark and suberect flexuous purplish-brown or reddish branches. Leaves subsessile, ⅓–¾ in. long, in loosely approximate pairs, spreading and decurved, elliptic-ovate, obtuse or subacute, quite entire, coriaceous, bright pale-green and shining above, with narrow red-brown margins. Racemes opposite, axillary from the base of the last year's shoots, 2–3 in. long, erecto-patent, very many-flowered, peduncle stout, flowers crowded; pedicels about as long as the calyx, puberulous; bracts ovate, obtuse or acute, about as long as the pedicel. Sepals about ⅙ in. long, acute, ciliolate. Corolla pale violet-blue, ½ in. diam., tube as long as the sepals; lobes rounded, three upper subequal, the lower narrower. Stamens as long as the corolla-lobes or shorter; anthers red-brown, bases of cells rounded. Capsule ellipsoid, about ⅓ longer than the sepals or less."—*Cheesem. Man. N.Z. Fl.* (1906) 517.

Apparently a distinct species. It was raised at the Royal Botanical Gardens, Edinburgh, from seeds sent from New Zealand, but from what locality is not stated. Its nearest ally is probably *V. Traversii*, from which it differs in the smaller leaves with red-brown margins, in the usually longer racemes, in the much larger violet (not white) flowers, in the longer acute sepals, which almost equal the short corolla-tube, and in the shorter and broader capsule. I have seen no specimens, and have consequently reproduced the original description.

Since the above was printed I have received a dried specimen from Edinburgh which agrees fairly well with Hooker's plate, with the exception that the leaves are slightly broader and shorter.

39. **V. Darwiniana** *Col. in Trans. N.Z. Inst.* xxv (1893) 332.—A small compact rounded shrub; branches numerous, terete, glabrous or the younger ones faintly pubescent; bark brownish-green. Leaves rather laxly placed, decussate, sessile or nearly so, horizontally spreading, ½–¾ in. long, ⅙–⅓ in. broad, ovate-lanceolate or narrow elliptic-oblong, acute, rather thick and coriaceous, glaucous on both surfaces, slightly concave above, not keeled beneath; margins entire, minutely ciliolate when young. Racemes 2–4 near the tips of the branches, ¾–1½ in. long, dense-flowered, tapering to the tip; rhachis, pedicels, and bracts pubescent; pedicels about as long as the calyx or shorter. Flowers white, ¼ in. diam. Calyx 4-partite; segments broadly ovate, obtuse or subacute. Corolla-tube short and broad, about as long as the calyx, throat pubescent within; lobes longer than the tube, broadly oblong, obtuse. Ovary pubescent or glabrous. Capsule ovate, acute, compressed, more than twice as long as the calyx.—*Cheesem. Man. N.Z. Fl.* (1906) 518. V. glaucophylla *Cockayne in Trans. N.Z. Inst.* xxxi (1899) 422.

H. glaucophylla Ckn. Trans 26:1929:471

NORTH ISLAND: Hawke's Bay—On hills in the interior, *Colenso!* SOUTH ISLAND: Nelson—Hanmer district, hills by Jack's Pass, *Cockayne, Petrie!* Canterbury—Craigieburn Mountains, *Cockayne!* 2000–3500 ft. December–February.

This is probably nearer to some of the forms included under *V. Traversii* than to any other, but can be separated by the more distant not keeled glaucous leaves, tapering racemes, and short corolla-tube hairy in the throat. Dr. Cockayne's plant has rather smaller and narrower leaves than Colenso's type, but otherwise there is little difference between them.

40. **V. Traversii** *Hook. f. Handb. N.Z. Fl.* (1864) 208 (*in part*).—A small perfectly glabrous shrub, usually forming a round compact bush 2–5 ft. diam.; branches terete, densely clothed with decussate leaves. Leaves spreading, petiolate or subsessile, uniform in size and shape, $\frac{1}{2}$–1 in. long, $\frac{1}{6}$–$\frac{1}{3}$ in. broad, elliptic-oblong or elliptic-lanceolate to linear-oblong, acute or subacute, usually narrowed to an acute base, coriaceous, channelled above, more or less keeled beneath, nerveless, margins entire, midrib usually strong. Racemes near the tips of the branches, 1–3 in. long, long and tapering or short and obtuse, simple, many-flowered; rhachis slender, puberulous; pedicels variable in length; bracts small. Flowers white, $\frac{1}{4}$ in. diam. Calyx 4-partite; segments broadly oblong or ovate, obtuse, margins often membranous, ciliolate. Corolla-tube from slightly longer to nearly twice as long as the calyx; limb 4-lobed; lobes subequal, oblong, obtuse. Capsule elliptic-ovate, acute, compressed, twice as long as the calyx.—*Bot. Mag.* (1878) t. 6390; *Masters in Gard. Chron.* (1873) 1046; *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 351; *Cheesem. Man. N.Z. Fl.* (1906) 519; *Adamson in Journ. Linn. Soc.* xl (1912) 257.

Var. **fallax** *Cheesem.*—Not so closely branched, often reddish-brown when fresh. Leaves more laxly placed, sessile, linear-oblong or oblong-lanceolate, acute or obtuse, flat or nearly so. Racemes lax-flowered; pedicels very short. Corolla-tube short, only slightly exceeding the calyx.

Var. **elegans** *Cheesem.*—Branches slender. Leaves more laxly placed, spreading, narrow linear-oblong, flat. Racemes oblong, obtuse; pedicels long, slender. Calyx small. Corolla-tube long, narrow, two or three times the length of the calyx.

SOUTH ISLAND: Abundant in mountain districts from Nelson to Otago. 500–3500 ft. December–February.

There is much confusion as to the limits of this species. The description given in the Handbook evidently includes more species than one; but without an examination of the material which Hooker had before him it is not easy to decide which should be taken as the type. I have selected the plant figured in the *Botanical Magazine* (t. 6390), which is also identical with that described by Dr. Masters in the *Gardeners' Chronicle*. It appears to have been included in the original description, has a wide distribution in the South Island, and is the form usually cultivated under the name of *V. Traversii;* but I am unable to say whether it was actually collected by Travers. On the other hand, Mr. N. E. Brown, who has lately examined the whole of the New Zealand *Veronicae* in the Kew Herbarium, is of opinion that my var. *elegans* should be regarded as the type. It was collected by both Travers and Haast, but seems to be a local plant, all the specimens I have seen having come from the Canterbury Provincial District. It differs conspicuously from the *Botanical Magazine* plant in the long and slender corolla-tube, in that and other respects approaching *V. leiophylla*. Probably the two plants are distinct, but I hesitate to describe them as such until more conclusive evidence has been obtained.

41. **V. evenosa** *Petrie in Trans. N.Z. Inst.* xlviii (1916) 189.—A tall perfectly glabrous shrub 4–8 ft. high; main branches wide-spreading, ultimate branchlets numerous, slender, twiggy, ringed with the scars of the fallen leaves. Leaves spreading, $\frac{1}{2}$–$1\frac{1}{4}$ in. long, $\frac{1}{3}$ in. broad, narrow-elliptic, very uniform in size and shape, gradually tapering to a narrow sessile base, acute or subacute at the tip, thin, midrib grooved above,

H. scott-thomsonii Allan Trans 69:1939:274

H. tucticati T.+S. " 70:30.
Tatakitaki R. 75:193

keeled below, lateral veins wanting, margins slightly thickened; upper surface dull-green, midrib and margins often reddish-brown beneath. Racemes few in the axils of the upper leaves, twice as long as the leaves, dense-flowered; rhachis slender, sparsely pubescent, the lower third naked. Flowers small, $\frac{1}{5}$ in. diam., white. Calyx 4-partite; lobes thin, oblong, ciliate. Corolla-tube twice as long as the calyx, lobes rounded. Mature capsules not seen.

North Island: Tararua Mountains, upper part of the forest-belt on Mount Holdsworth, altitude 2800 ft., *Petrie!* Mount Hector, *B. C. Aston!*

This appears to be a distinct species, easily recognized by the flat and rather thin elliptic acute leaves, dense racemes, and small white flowers.

42. **V. subalpina** *Cockayne in Trans. N.Z. Inst.* xxxi (1899) 420.—A much-branched erect shrub 3–6 ft. high; branches suberect or spreading, terete, glabrous or the younger ones minutely puberulous, leafy above, below ringed with the scars of the fallen leaves. Leaves spreading, sessile, $\frac{3}{4}$–$1\frac{1}{2}$ in. long, $\frac{1}{5}$–$\frac{1}{3}$ in. broad, lanceolate or oblong-lanceolate, broadest below the middle, acute or subacute, subcoriaceous, pale glistening-green, slightly concave above when fresh, flat when dry, margins entire. Racemes 2–4 near the tips of the branches, equalling the leaves or longer than them, 1–2 in. long, simple, dense- or lax-flowered; rhachis slender, puberulous; lower pedicels slender, usually exceeding the calyx; bracts small. Calyx deeply 4-partite; segments ovate-lanceolate or ovate-oblong, acute, margins ciliolate. Corolla-tube short and broad, hardly exceeding the calyx; limb longer than the tube, 4-lobed; lobes oblong, obtuse. Capsule $\frac{1}{4}$ in. long, ovate, acute, compressed, about twice as long as the calyx.—*Cheesem. Man. N.Z. Fl.* (1906) 519.

South Island: Nelson—Clarence Valley, *T. Kirk! T. F. C.;* Lake Tennyson, *T. F. C., R. M. Laing!* Canterbury—Arthur's Pass and Upper Waimakariri, *J. D. Enys! T. Kirk! T. F. C., Cockayne!* Rakaia Valley, *Haast!* Mount Arrowsmith, *Cockayne* and *R. M. Laing;* Mount Cook district, *T. F. C.;* Copeland Pass, *Cockayne!* Westland—Kelly's Hill, Jackson's, &c., *Petrie, Cockayne, P. G. Morgan!* Otago—Haast River and Makarora Valley, *Poppelwell;* Clinton Valley, *Cockayne, F. G. Gibbs!* Eyre Mountains, *Poppelwell;* Lake Harris, *T. Kirk!* 2500–4500 ft. December–March. T. 71:91. Willmott Pass 75:193

Very close to *V. Traversii*, as I understand that plant, but, I think, sufficiently distinct in the different habit, flatter lanceolate leaves, which taper from below the middle to an acute or subacute apex, acute calyx-lobes, and short and broad corolla-tube. Mr. N. E. Brown informs me that specimens collected by Haast and Hector and Buchanan exist in the Kew Herbarium, but were referred to *V. Traversii* by Hooker. It is an abundant subalpine plant along the central chain of the Southern Alps.

43. **V. vernicosa** *Hook. f. Handb. N.Z. Fl.* (1864) 208.—A small usually rather stout erect or decumbent shrub 1–3 ft. high; branches spreading, often in the same plane, pubescent at the tips or almost glabrous. Leaves close-set, decussately inserted but often becoming almost distichous from the twisting of the petioles, spreading, petiolate, $\frac{1}{4}$–$\frac{2}{3}$ in. long, $\frac{1}{6}$–$\frac{1}{3}$ in. broad, obovate or obovate-oblong, obtuse or apiculate, suddenly contracted into the short petiole, coriaceous, flat or slightly concave; midrib impressed above, thick and prominent beneath, excurrent; margins entire, sometimes ciliolate when young. Racemes few or many near the tips of the branches, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, simple, usually dense-flowered but sometimes lax; rhachis, pedicels, and bracts pubescent; pedicels variable in length, sometimes almost wanting, at other times equalling the bracts. Flowers white,

H. venicosa (Hk.f.) C+A. var canterburiensis (J.B.A.) C+A. p.30.

H. grayi (J.B.A.) Cheesem. Trans 60:1927:471 (= venicosa ? see WAH 1935:6:99

$\frac{1}{4}$–$\frac{1}{3}$ in. diam. Calyx 4-partite; segments oblong, obtuse; margins usually pale, membranous, ciliolate. Corolla-tube short and broad, usually about as long as the calyx, rarely slightly exceeding it; limb 4-lobed, longer than the tube; lobes spreading, ovate-oblong, obtuse. Capsule ovate, acute, compressed, glabrous, rather more than twice as long as the calyx.—*T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 526; *Cheesem. Man. N.Z. Fl.* (1906) 520. V. canterburiensis *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 355.

Var. **gracilis** *Cheesem.*—Much more slender and more sparingly branched; branches widely divaricating. Leaves distichously spreading, narrower and less coriaceous than in the type, linear-obovate or linear-oblong to oblong-obovate, obtuse or subacute. Racemes 1–4 near the tips of the branches, 1–2 in. long, very slender and lax-flowered; pedicels longer. Capsule narrow-ovate, acute.

Var. **multiflora** *Cheesem.*—Racemes very numerous, forming a crowded mass near the tips of the branches, slender, tapering, many-flowered.—(?) V. Grayi *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 354.

South Island: Mountain districts in Nelson, Marlborough, Canterbury, and Westland, not uncommon. Sea-level to 4500 ft. December–February.

A well-marked species, recognized without much difficulty by the spreading habit and numerous short and broad leaves, which, although decussately inserted, usually spread in a more or less distichous manner through a twist in the petiole. In the typical state the racemes are generally numerous and rather short and dense-flowered; but in var. *gracilis*, which is a shade-form most common by the side of streams at low elevations, the racemes are usually fewer and much more slender and lax-flowered. Var. *multiflora* I have only seen in cultivation. It is known in gardens as *V. Grayi*, but I am not quite sure that it is the plant described by Armstrong under that name. Armstrong described his *V. canterburiensis* as having membranous leaves and the racemes in pairs at the end of the branches, so that probably he had var. *gracilis* in mind when he described the species; but for many years he applied the name to the typical form in the Botanical Gardens at Christchurch.

also Trans 60:1929:472

44. **V. obovata** *T. Kirk in Trans. N.Z. Inst.* ix (1877) 502.—An erect sparingly branched glabrous shrub 4–5 ft. high; branches stout, erect, ringed with the scars of the fallen leaves. Leaves shortly petioled, erect or suberect, laxly imbricating, $\frac{3}{4}$–1 in. long, $\frac{1}{4}$–$\frac{1}{3}$ in. broad, narrow-obovate, obtuse, gradually narrowed into the short broad flat petiole, slightly concave when fresh, thick and coriaceous, margins entire. Racemes 2 or 3 near the tips of the branches, 1–2 in. long, slender, erect, lax-flowered; rhachis puberulous; pedicels short; bracts small, ovate, acute. Flowers white, $\frac{1}{5}$ in. diam. Calyx 4-partite; segments ovate-oblong, obtuse. Corolla-tube short and broad, hardly longer than the calyx; limb 4-lobed; lobes spreading, oblong, obtuse. Ripe capsules not seen.—*Cheesem. Man. N.Z. Fl.* (1906) 521.

Lull. 4:1935:150.

South Island: Canterbury—Broken River, *T. Kirk!* Mount Cook district, *T. F. C.* Otago—Upper Hawea, *Petrie!* Mount Earnslaw, *Cockayne!* 2000–4500 ft.

The above description is based on Kirk's type specimens from the Broken River. My own specimens from the Mount Cook district, and Petrie's and Cockayne's from Otago, have rather smaller and less obovate leaves and longer racemes, and may be referable to *V. monticola*, if, indeed, the two species should not be combined.

45. **V. monticola** *J. B. Armstr.) in Trans. N.Z. Inst.* xiii (1881) 354.—A much-branched glabrous shrub 2–5 ft. high; branches erect or spreading, densely leafy above, ringed with the scars of the fallen leaves below; bark brown. Leaves close-set, more or less imbricate, suberect or spreading, $\frac{2}{3}$–1 in. long, $\frac{1}{3}$–$\frac{1}{2}$ in. broad, obovate-oblong or elliptic-oblong, obtuse or subacute; narrowed into a very short thick petiole, thick and coriaceous,

H. grayi (J.B.A.) Cheesem. 60:471.

V. " J.B.A. N.Z. Country Journ. 1879 (3) 57.

H. Godfreyana (Carr.) sp. hort. ckn. Trans 60 : 1929 : 471
= V. Godfreyana Carr. in Revue Hort. (1888) 455

slightly concave above, somewhat rounded but not keeled beneath; midrib impressed beneath when dry. Racemes near the tips of the branches, longer than the leaves, 1–1½ in. long, dense-flowered; rhachis puberulous; pedicels very short, stout; bracts ovate-lanceolate, subacute. Flowers white, ¼ in. diam. Calyx deeply 4-partite; segments oblong-ovate, obtuse or subacute. Corolla-tube short and broad, barely longer than the calyx; limb 4-lobed; lobes ovate, spreading. Capsule ovate-oblong, acute, about twice as long as the calyx.—*Cheesem. Man. N.Z. Fl.* (1906) 521; *Adamson in Journ. Linn. Soc.* xl (1912) 261.

See Wall : 4 : 1935 : 180

South Island: Mountain districts from Nelson to Otago, not uncommon. 2000–4500 ft. December–February.

This is the plant to which the name of *laevis* is usually applied in the South Island, but, I believe, erroneously, the true *laevis* having smaller and more rigid keeled leaves and a corymbose inflorescence. It agrees with an authentic specimen of *V. monticola* in Kirk's herbarium, but differs in several respects from Armstrong's original description. Kirk's *V. obovata* only differs in the more truly obovate leaves, and I have little doubt that it will ultimately be merged with that species.

46. **V. Cockayniana** *Cheesem. Man. N.Z. Fl.* (1906) 522.—A small densely branched shrub 2–4 ft. high; branches rather stout, densely leafy above, conspicuously marked with the scars of the fallen leaves below; younger ones more or less bifariously pubescent. Leaves close-set, decussate, suberect or spreading, shortly petiolate, uniform in size and shape, ⅓–⅔ in. long, ¼–⅓ in. broad, oblong or elliptic-oblong or obovate-oblong, obtuse, flat or slightly concave, thick and coriaceous, often black on the upper surface when dry, glaucous beneath; midrib puberulous above, thick and prominent beneath; margins entire. Racemes 2–4 near the tips of the branches, rather longer than the leaves, ½–1 in. long, simple, usually lax-flowered; rhachis, pedicels, and bracts pubescent. Flowers white, ¼–⅓ in. diam. Calyx deeply 4-partite; segments ovate-oblong, obtuse; margins pale, membranous, ciliolate. Corolla-tube short and broad, equalling the calyx or slightly longer; limb 4-lobed; lobes longer than the tube, broad, rounded, veined. Capsule ¼ in. long, ovate, acute, twice as long as the calyx.

South Island: Nelson—Mount Arthur and Mount Peel, *T. F. C., F. G. Gibbs!* Lyell Mountains and Mount Murchison, *W. Townson!* mountains near Reefton, *R. W. Raithby!* Otago—Humboldt Mountains, *Cockayne!* Clinton Valley, *Petrie! H. J. Matthews!* Mackinnon's Pass, *F. G. Gibbs!* Haast Pass, *Poppelwell!* 2500–4500 ft. December–February.

I look upon this as a perfectly distinct species, perhaps nearest to *V. laevis*, but easily distinguished by the pubescent branchlets, flatter and more spreading leaves glaucous beneath, by the simple lax-flowered racemes, and larger flowers with very short broad tube and broad rounded lobes. The blackish colour of the leaves when dried is very peculiar. It is probably not uncommon along the western side of the Southern Alps.

47. **V. buxifolia** *Benth. in DC. Prodr.* x (1846) 462.—A stout erect much or sparingly branched perfectly glabrous shrub 1–5 ft. high; branches strict, densely leafy, below closely ringed with the scars of the fallen leaves. Leaves closely imbricate, ⅙–⅓ in. long, ⅛–¼ in. broad, broadly oblong-obovate, obtuse or subacute, suddenly truncate or cordate above the very short thick petiole, concave, keeled by the prominent midrib, rigid, very coriaceous, dark-green and polished above, paler and usually minutely

T. 71 : 91
72 : 427.
var. prostrata (Cku) C+A.
odora (Kirk part) C+A. 56 : 1926 : 27
paucicrenosa C+A.

dotted beneath, quite glabrous, entire. Spikes in the axils of the upper leaves, ¼–1 in. long, dense-flowered, often very numerous and crowded, forming a corymbose head to the branches; rhachis puberulous; bracts large, ovate, concave, coriaceous, equalling the calyx or sometimes exceeding it. Flowers sessile, white, ¼–⅓ in. diam. Calyx 4-partite; segments coriaceous, oblong, obtuse, ciliolate. Corolla-tube equalling the calyx or rather longer than it; limb 4-lobed; dorsal and lateral lobes broad, rounded; anticous narrower and subacute. Capsule broadly oblong, obtuse, compressed, almost twice as long as the calyx.—*Hook. f. Fl. Nov. Zel.* i (1853) 194; *Handb. N.Z. Fl.* (1864) 210; *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 350; *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 523; *Cheesem. Man. N.Z. Fl.* (1906) 522; *Adamson in Journ. Linn. Soc.* xl (1912) 259.

Var. **patens** *Cheesem. l.c.* 523.—Leaves spreading. Spikes more numerous. Flowers rather larger.—V. buxifolia *var.* odora *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 524 (*but not* V. odora *Hook.*).

North Island: High mountains of the interior, from Hikurangi, Tongariro, and Mount Egmont southwards to the Tararua Range. South Island: Abundant in mountain districts throughout. Var. *patens:* Plentiful from Nelson to Foveaux Strait. Stewart Island: Not uncommon. Usually from 2000 to 4000 ft., but descends to sea-level in Stewart Island. December–March.

An abundant plant in mountain districts, recognized without any difficulty by the stout erect rigid habit, dark-green closely imbricated keeled leaves, which are conspicuously truncate or subcordate at the base, and by the usually numerous short spikes massed into a compact terminal inflorescence. Mr. Kirk considered my var. *patens* to be identical with *V. odora* Hook. f., which Hooker had reduced to *V. buxifolia* in the Handbook; but Mr. N. E. Brown, who has kindly examined the types of *V. odora* for me, states that this view is altogether incorrect.

48. **V. odora** *Hook. f. Fl. Antarct.* i (1844) 62, t. 41.—A slender sparingly branched perfectly glabrous shrub 2–4 ft. high. Branchlets slender, strict, erect, sparingly divided, leafy above, subangled, decussately grooved, the grooves more or less puberulous. Leaves closely imbricate, uniform in size and shape, ½–⅔ in. long, ¼ in. broad, horizontally spreading or the lower ones slightly reflexed, shortly petiolate with the petiole erect, elliptic-ovate, subacute, almost truncate at the base, midrib prominent beneath, but the leaves otherwise veinless, margins cartilaginous, minutely and roughly crenulate, coriaceous, dull-green and shining above, paler beneath. Spikes or racemes in the axils of the upper leaves, forming a corymb-like head, dense-flowered; rhachis bifariously pubescent; bracts small. Calyx deeply 4-partite; segments oblong-ovate, obtuse, minutely ciliolate. Corolla white, ¼–⅓ in. diam.; tube equalling the calyx or rather longer than it; limb 4-lobed; lobes almost equal in size, or the anticous rather narrower. Ripe fruit not seen. — *Cheesem. in Subantarct. Is. N.Z.* (1909) 424 V. buxifolia *var.* odora *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 524. V. elliptica *var.* odora *Cheesem. Man. N.Z. Fl.* (1906) 516.

Auckland Islands: In woods near the sea, not uncommon, *Hooker;* Norman's Inlet and Port Ross, *B. C. Aston!*

In the absence of authenticated specimens I referred this plant to *V. elliptica* in the first edition of this work. But the receipt of an ample series of specimens collected by Mr. B. C. Aston has convinced me that this is a mistake, and that it must be regarded as a distinct species, closely allied to *V. buxifolia.* For further particulars, see "The Subantarctic Islands of New Zealand," ii, pp. 424, 447.

H. brockiei S+T. 72 : 28. Head Dusky Sound.

(N.Z.A.) Chch. Trans. 60:1929:468

49. **V. anomala** *J. B. Armstr. in Trans. N.Z. Inst.* iv (1872) 291.—An erect perfectly glabrous much-branched shrub 3–5 ft. high; branches long, slender, fastigiate, leafy, purplish towards the tips. Leaves spreading, sessile or nearly so, $\frac{1}{3}$–$\frac{3}{4}$ in. long, $\frac{1}{8}$–$\frac{1}{5}$ in. broad, linear-oblong or elliptic-lanceolate, subacute, keeled, coriaceous, dark-green and shining above, paler beneath, midrib obscure. Spikes crowded together at the tips of the branches, 5–10-flowered, forming a short terminal panicle; rhachis puberulous; bracts ovate, acute, coriaceous, as long as the calyx. Flowers sessile, white or pale-pink, $\frac{1}{4}$–$\frac{1}{3}$ in. diam. Calyx 3-partite with one of the segments broader and emarginate or 2-lobed, more rarely 4-partite; segments linear-oblong, obtuse. Corolla-tube slender, tubular, about twice as long as the calyx; limb either 3-lobed with the anticous lobe entirely suppressed, or 4-lobed with the anticous lobe small and narrow-linear; the dorsal and lateral lobes oblong, obtuse. Capsule ovate-oblong, obtuse, glabrous, $\frac{1}{2}$ as long again as the calyx.—*Trans. N.Z. Inst.* xiii (1881) 355; *Hook. f. Bot. Mag.* (1894) t. 7360; *Cheesem. Man. N.Z. Fl.* (1906) 523; *Adamson in Journ. Linn. Soc.* xl (1912) 256. see Wall 4:1935:100 (Rec. C.M.)

South Island: Canterbury—Rakaia Valley, *J. B. Armstrong! E. Stead.* Also reported from Mount Peel and the Mount Cook district, but I have seen no specimens from thence.

A very handsome and attractive species, quite common as a garden-plant, but very rare in the wild state. The few wild specimens that I have seen agree with Mr. Armstrong's description in the total suppression of the anticous lobe of the corolla, but cultivated specimens are variable in this respect. Usually some of the flowers want the anticous lobe and others possess it; but it is easy to find plants in which it is either always absent or always present. Sir J. D. Hooker (*Bot. Mag.* (1894) t. 7360) states that in plants cultivated in England he has never seen flowers with the anticous lobe entirely suppressed, although it is always smaller and narrower than the other three.

50. **V. decumbens** *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 352.—A small decumbent much-branched shrub 1–3 ft. high; branches spreading, purplish-black, bifariously pubescent. Leaves close-set or rather distant, spreading, shortly petiolate, $\frac{1}{3}$–$\frac{3}{4}$ in. long, $\frac{1}{5}$–$\frac{1}{3}$ in. broad, oblong-obovate or elliptic-oblong or narrow oblong-ovate, subacute or obtuse, coriaceous when dry, almost fleshy when fresh, quite glabrous, flat or slightly concave, dark-green with bright-red margins. Racemes 2–4 near the tips of the branches, equalling the leaves or slightly longer than them, shortly peduncled, dense-flowered; rhachis pubescent; pedicels very short, sometimes almost wanting; bracts small, much shorter than the calyx. Flowers white, $\frac{1}{4}$ in. diam. Calyx deeply 4-partite; segments ovate, acute, margins minutely ciliolate. Corolla-tube twice as long as the calyx or rather longer; limb 4-lobed; lobes broadly oblong, obtuse, the anterior one narrower. Capsule ovate, acute, compressed, glabrous, twice as long as the calyx.—*Cheesem. Man. N.Z. Fl.* (1906) 524.

South Island: Mountains of Nelson, Marlborough, and North Canterbury, not uncommon. 1500–4500 ft. December–February.

A very beautiful little plant, well marked off from all its allies by the polished purplish-black branchlets, almost flat green leaves with red margins, shortly pedicellate flowers, small bracts, long corolla-tube, and short limb. Mr. Armstrong's description is by no means good; but there is no question as to the identity of the plant.

51. **A. Willcoxii** *Petrie in Trans. N.Z. Inst.* xlv (1913) 272.—An erect or spreading much-branched glabrous shrub 2–4 ft. high; branches rather stout, ringed with the scars of the fallen leaves, glabrous or the younger

H. Allanii Ckn Trans 56:1926:25
H. lapidosa S.+T. " 70: 31
73: 163

ones faintly bifariously pubescent; bark brownish-black. Leaves close-set or somewhat distant, more or less imbricate, sessile or nearly so, almost connate at the base, $\frac{1}{3}$–$\frac{2}{3}$ in. long, $\frac{1}{4}$ in. broad, oblong-obovate or elliptic-obovate, subacute or obtuse, coriaceous, narrowed to a broad base, quite glabrous; upper side concave, dark-green and shining, varnished, below more or less glaucescent, finely punctulate; midrib stout, excurrent; margins recurved when dry. Racemes 2–4 in the axils of the uppermost leaves, 1–1$\frac{1}{2}$ in. long, dense-flowered, shortly peduncled; rhachis puberulous; pedicels short; bracts subulate-lanceolate. Flowers white, $\frac{1}{4}$ in. diam. Calyx deeply 4-partite; segments oblong, with thin scarious margins. Corolla-tube short and broad. Capsule broadly oblong-ovate, acute, compressed, twice as long as the calyx. see Trans 72:28

South Island: Otago—Vicinity of Lake Harris and the Routeburn Valley, *W. Wilcox* and *Petrie! Cockayne, H. J. Matthews! W. A. Thomson!* 3000 ft. February–March.

As Mr. Petrie suggests, this species is probably nearest to *V. decumbens*, from which it is easily distinguished by the more erect and compact habit, and by the more obovate leaves, which want the red margins of *V. decumbens*, and which are glaucescent on the under-surface. It has been in cultivation for more than twenty years, but is apparently rare in the wild state.

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52. **V. Gibbsii** *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 524.—A sparingly branched shrub 9–18 in. high; branches as stout as a goose-quill, ringed with the scars of the fallen leaves. Leaves decussate, close-set, imbricating, erect or spreading, sessile, $\frac{1}{3}$–$\frac{3}{4}$ in. long, $\frac{1}{4}$–$\frac{1}{2}$ in. broad, ovate or ovate-oblong, acute or obtuse, coriaceous, glaucous, often tinged with purplish-red, glabrous except the margins, which are fringed with long soft white hairs. Spikes 2–4 near the tips of the branches, peduncled, longer than the leaves, dense-flowered; rhachis and bracts villous with soft white hairs; bracts lanceolate, acute, exceeding the calyx. Flowers $\frac{1}{5}$ in. diam., white, sessile or the lower ones very shortly pedicelled. Calyx 4-partite; segments lanceolate or ovate-lanceolate, acute, margins villous. Corolla-tube narrow, about twice as long as the calyx; limb 4-lobed; lobes ovate, acute. Style glabrous or sparingly villous near the base. Capsule narrow-ovate, acute, compressed, about twice as long as the calyx.—*Cheesem. Man. N.Z. Fl.* (1906) 524; *Ill. N.Z. Fl.* ii (1914) t. 152.

South Island: Nelson—So far only found on Mount Rintoul and Ben Nevis, two of the chief peaks of the Dun Mountain Range, alt. 3000–4000 ft., *F. G. Gibbs!*

A distinct species, which cannot be confused with any other. Its nearest ally is *V. carnosula*, from which it is easily distinguished by the less concave and more acute leaves, and especially by their conspicuously villous margins. Its bracts, too, are more acuminate, and the calyx-segments are narrower and more acute. The villous margins of the leaves form a very remarkable character, and one which cannot be matched among all the other species found in New Zealand.

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53. **V. carnosula** *Hook. f. Handb. N.Z. Fl.* (1864) 210.—A much-branched erect or decumbent woody shrub 6 in. to 3 ft. high; branches stout, spreading, ringed with the scars of the fallen leaves, the younger ones pubescent towards the tips. Leaves closely imbricating, spreading or erect, sessile, $\frac{1}{3}$–$\frac{3}{4}$ in. long, $\frac{1}{4}$–$\frac{2}{3}$ in. broad, broadly obovate or almost orbicular, obtuse, very coriaceous, concave, not keeled, quite glabrous, nerveless or the midrib very obscure, glaucous; margins smooth and even. Spikes crowded near the ends of the branches, often forming a dense

see Trans 60:1929: 269

terminal head, short, stout, very dense-flowered; peduncle, rhachis, and bracts pubescent or almost villous; bracts equalling the calyx, ciliolate. Flowers about $\frac{1}{4}$ in. diam., sessile, white. Calyx 4-partite; segments erect, ovate-oblong, obtuse, slightly ciliate. Corolla-tube equalling the calyx or rather shorter than it; limb 4-lobed. Ovary and style glabrous. Capsule $\frac{1}{6}$–$\frac{1}{5}$ in. long, ovate, acute, glabrous, compressed, about twice as long as the calyx.—*J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 350; *Cheesem. Man. N.Z. Fl.* (1906) 524; *Adamson in Journ. Linn. Soc.* xl (1912) 260. V. laevis *var.* carnosula *Hook. f. Fl. Nov. Zel.* i (1853) 194.

South Island: Mountain districts from Nelson to Otago, but apparently not so abundant as *V. pinguifolia*. 2500–4500 ft. December–March.

Very closely allied to *V. pinguifolia*, differing mainly in the rather larger ovate-acute glabrous capsule. The capsule of *V. pinguifolia* is obovate-oblong, rounded or emarginate at the tip, and more or less pubescent.

54. **V. Biggari** *Cockayne in Trans. N.Z. Inst.* xlviii (1916) 199.—A small decumbent shrub 1–3 ft. high; branches strict, slender, spreading, ringed with the scars of the fallen leaves, quite glabrous. Leaves somewhat distichous, close-set, $\frac{1}{2}$–$\frac{3}{4}$ in. long, $\frac{1}{5}$–$\frac{1}{3}$ in. broad, obovate-oblong or oblong, sessile or nearly so, quite glabrous, coriaceous, glaucous, often tinged with reddish-purple, transversely wrinkled when dry, obtuse or subacute; margins entire, slightly thickened. Racemes 6–12, springing from the axils of the leaves, 1–1$\frac{1}{2}$ in. long, dense-flowered. Flowers small, white. Calyx-segments short, ovate-oblong, subobtuse. Corolla-tube short, lobes obovate, nearly equal. Capsule ovoid, compressed, puberulous when young.

South Island: Otago—Eyre Mountains, near Lake Wakatipu, alt. 4500 ft., *Poppelwell!* Mount Dick, *Cockayne!*

This seems to be nearest to *V. albicans* and *V. amplexicaulis*, but differs in the much smaller size, much smaller leaves, numerous dense-flowered racemes, and small white flowers. Dr. Cockayne sends a small variety with shorter rounder leaves.

55. **V. albicans** *Petrie in Trans. N.Z. Inst.* xlix (1917) 53.—A low spreading much-branched shrub 2–4 ft. high; main branches stout, ringed with the scars of the fallen leaves; bark dark-brown, glabrous or when young with a pubescent line decurrent from the base of the leaves. Leaves decussate, spreading, closely imbricate, $\frac{2}{3}$–1 in. long, $\frac{1}{3}$–$\frac{1}{2}$ in. broad, oblong-ovate to broadly oblong or almost orbicular, sessile by a broad base, rarely subcordate, obtuse or more rarely subacute, quite entire, thick and coriaceous, glaucous, more or less concave; margins smooth, entire. Racemes 2 or 3 opposite pairs in the axils of the upper leaves, stout, many-flowered; rhachis pubescent; bracts short, linear-lanceolate, acute. Flowers densely placed, white. Calyx deeply 4-partite; lobes ovate-oblong, obtuse or subacute, margins ciliate. Corolla-tube broad, barely twice as long as the calyx. Capsule ovoid, glabrous, twice as long as the calyx.

South Island: Nelson—Mount Arthur, *T. F. C., F. G. Gibbs! H. J. Matthews!* Mount Cobb and Mount Lockett, north-west Nelson, *F. G. Gibbs.* 3500–4500 ft.

Far too closely allied to *V. amplexicaulis*, from which it only differs in the usually narrower leaves, which are hardly cordate at the base, and in the simple racemes.

var. vera C+A
Suberecta " Trans 56:1926:26.
erecta "

56. **V. amplexicaulis** *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 352.—An erect or decumbent shrub 1–3 ft. high; branches stout, spreading, ringed with the scars of the fallen leaves; branchlets terete, glabrous or puberulous. Leaves decussate, imbricate, suberect or spreading, sessile, ½–1 in. long, ⅓–⅔ in. broad, broadly oblong or elliptic-oblong, rounded at the tip, subcordate and almost amplexicaul at the base, very coriaceous, glaucous, concave, nerveless, not keeled; margins smooth and even. Spikes 2–4 near the tips of the branches, 1–1½ in. long, stout, oblong, very dense-flowered, simple or trifurcate; peduncles stout, exceeding the leaves, and with the rhachis pubescent with soft spreading hairs; bracts large, equalling the calyx, broadly oblong, concave, obtuse, margins ciliate. Flowers white, ¼ in. diam., sessile. Calyx 4-partite; segments erect, oblong, obtuse, ciliate. Corolla-tube about the length of the calyx; limb 4-lobed; dorsal lobe the broadest, erect; the other 3 narrow-oblong, obtuse, spreading or decurved. Ovary pubescent. Capsule oblong, rounded at the tip, pubescent, about ½ as long again as the calyx.—*Hook. f. Bot. Mag.* (1894) t. 7370; *Cheesem. Man. N.Z. Fl.* (1906) 525.

South Island: Canterbury—Upper Rangitata, *J. B. Armstrong!* Mount Arrowsmith, *Cockayne* and *R. M. Laing!* Mount Peel, *H. H. Allan! Cockayne.* 3500–4500 ft. January–February.

Closely related to *V. pinguifolia*, from which it differs in the larger leaves, which are cordate and semiamplexicaul at the base, and in the larger and often branched spikes. Mr. Armstrong describes the corolla-tube as "long," but it barely equals the calyx in all the specimens I have seen, including an authentic one from him.

57. **V. pinguifolia** *Hook. f. Handb. N.Z. Fl.* (1864) 210.—An erect or decumbent much-branched glaucous shrub 6 in. to 4 ft. high; branches stout, spreading, ringed with the scars of the fallen leaves, the younger ones bifariously pubescent. Leaves closely imbricating, spreading or erecto-patent, sessile, ¼–¾ in. long, ⅙–½ in. broad, broad or narrow obovate-oblong to broadly oblong or suborbicular, obtuse, narrowed to a broad base, concave above, rounded at the back, very coriaceous or almost fleshy, quite glabrous, nerveless, glaucous, margins often edged with red. Spikes crowded near the tips of the branches, short, stout, dense-flowered, exceeding the leaves; peduncle and rhachis pubescent; bracts oblong, concave, as long as the calyx. Flowers white, ¼–⅓ in. diam., sessile. Calyx 4-partite; segments erect, oblong, obtuse, puberulous, margins ciliolate. Corolla-tube short, not exceeding the calyx; limb 4-lobed; lobes ovate-oblong or broadly oblong, obtuse, the anterior one narrower than the others. Ovary pubescent; style usually villous towards the base. Capsule oblong or obovate, obtuse, rounded at the tip, pubescent, from ½ as long again to nearly twice as long as the calyx.—*Bot. Mag.* (1875) t. 6147; *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 350; *Cheesem. Man. N.Z. Fl.* (1906) 525; *Adamson in Journ. Linn. Soc.* xl (1912) 259. V. carnosula *Hook f. in Bot. Mag.* (1881) t. 6587 (*not of Handb. N.Z. Fl.* (1864) 210).

South Island: Mountains of Nelson, Marlborough, Canterbury, and Otago, abundant. 2500–4500 ft. December–February.

A very variable plant, especially in size and mode of growth, and in the size, shape, and colour of the leaves. Its nearest allies are *V. carnosula* and *V. amplexicaulis*, the first of which differs in the glabrous ovary and acute capsule, the latter in the larger leaves subcordate at the base, and larger often branched spikes. Small states, with smaller and narrower and more rigid leaves, approach var. *major* of *V. Buchanani*. From the other species of the section it is at once removed by the deeply concave obtuse leaves rounded (not keeled) at the back.

H. treadwellii C+A. 56:1926:27 Mt Sebastopol

H. allanii Chm. T. 56:25.

58. **V. Buchanani** (*Hook. f.*) *Handb. N.Z. Fl.* (1864) 211. — A small woody shrub 4–12 in. high, much branched from the base; branches stout, terete, spreading or decumbent, sometimes tortuous, closely ringed with the scars of the fallen leaves; bark black; branchlets usually pubescent at the tips. Leaves decussate, closely imbricate, sessile by a broad base, suberect or spreading, rarely deflexed, $\frac{1}{8}$–$\frac{1}{4}$ in. long and almost as broad, broadly oblong or almost orbicular, obtuse or more rarely subacute, very thick and coriaceous, concave, rarely obscurely keeled, nerveless, quite glabrous. Spikes 2–4 near the tips of the branches, short and stout but much longer than the leaves, oblong, dense-flowered, shortly peduncled; peduncle and rhachis villous-pubescent; bracts large, concave, ciliate, equalling the calyx or exceeding it. Flowers $\frac{1}{5}$ in. diam., white, sessile. Calyx 4-partite; segments erect, oblong, obtuse, ciliolate. Corolla-tube short, included in the calyx or barely equalling it; limb 4-lobed; lobes broadly oblong, obtuse. Ovary and style pubescent. Capsule nearly twice as long as the calyx, oblong or oblong-obovate, obtuse, pubescent.—*J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 350; *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 523; *Cheesem. Man. N.Z. Fl.* (1906) 526.

Var. **major** *Cheesem.* — Taller and stouter. Leaves larger, spreading, $\frac{1}{4}$–$\frac{1}{2}$ in. long, obovate or obovate-oblong, narrowed to the base, midrib often distinct beneath. Spikes larger, 1 in. long; peduncle and rhachis densely villous. Style conspicuously villous.

Var. **exigua** *Cheesem.* — Branches numerous, twiggy. Leaves narrower, $\frac{1}{6}$–$\frac{1}{4}$ in., oblong-ovate, subacute, obscurely keeled. Spikes small, $\frac{1}{3}$ in. long, few-flowered.

South Island: Canterbury—Mount Cook district (var. *major* and *exigua*), *T. F. C., H. J. Matthews! Miss L. S. Gibbs!* Otago—Mount Alta, *Buchanan!* Mount Arnould, *Petrie!* Mount Kyeburn (var. *major*), *Petrie! H. J. Matthews!* summit of Lindis Pass, *Cockayne.* 3000–7000 ft. December–February.

Also a very variable plant. The extreme state, represented by Buchanan's Mount Alta specimens, is easily recognized by the small uniform close-set almost orbicular spreading leaves and capitate spikes; but larger forms approach *V. pinguifolia* so closely that it is difficult to draw a line of demarcation between the two species. My var. *major* might be referred to either.

59. **V. pimeleoides** *Hook. f. Fl. Nov. Zel.* i (1853) 195.—A small much-branched prostrate or suberect shrubby plant 3–18 in. high; branches rather slender, straggling, pubescent or almost villous, rarely glabrous. Leaves usually rather laxly placed, rarely close-set, spreading or suberect, sessile, $\frac{1}{6}$–$\frac{1}{3}$ in. long, obovate-oblong or ovate-oblong to elliptic-lanceolate, obtuse or subacute, coriaceous, glaucous, obtusely keeled. Spikes near the tips of the branches, peduncled, exceeding the leaves, $\frac{1}{2}$–1 in. long; rhachis villous-pubescent; bracts large, almost or quite equalling the calyx, ciliate. Flowers $\frac{1}{4}$ in. diam., dark purplish-blue, sessile. Calyx 4-partite; segments ovate, acute, ciliate. Corolla-tube very short, not equalling the calyx; limb broad, spreading, 4-lobed; lobes broad, obtuse, the anterior one narrower than the others. Capsule $\frac{1}{6}$ in. long, ovate, acute, turgid, glabrous or slightly pubescent, twice as long as the calyx.—*Handb. N.Z. Fl.* (1864) 211; *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 350; *Cheesem. Man. N.Z. Fl.* (1906) 527; *Adamson in Journ. Linn. Soc.* xl (1912) 258.

Var. **glauco-caerulea** *Cheesem.* — Larger and stouter, more intensely glaucous. Leaves $\frac{1}{3}$–$\frac{1}{2}$ in. long, obovate or obovate-oblong, shortly petiolate. Flowers dark-blue or purple. V. glauco-caerulea *J. B. Armstr. l.c.* 353.

Var. **minor** *Hook. f. Handb. N.Z. Fl.* (1864) 738.—Smaller, 1–4 in. high, sparingly branched. Leaves smaller and narrower, $\frac{1}{8}$–$\frac{1}{6}$ in. long, lanceolate to oblong-ovate, usually acute. Spikes small, few-flowered.

H. dartoni (Petrie) Cockn sp. nov. Trans 60: 1929: 470
= V. dartoni Petrie Trans 55: 1924: 98

South Island: Mountains of Canterbury and Otago, not uncommon in dry places. 1000–3500 ft. November–January.

Well marked by the small size, prostrate or straggling habit, small glaucous leaves, villous spikes, and purplish-blue flowers.

W. H. Cilliolata Pl. ... 1910. p. 39

60. **V. Gilliesiana** *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 519.—Stems prostrate or decumbent, much branched, 3–12 in. long; branches spreading or suberect, densely leafy, tetragonous, with the leaves on $\frac{1}{4}$–$\frac{1}{3}$ in. diam., bright-green when fresh, black when dry. Leaves densely imbricating, opposite pairs connate by the dilated bases, spreading above, $\frac{1}{6}$–$\frac{1}{3}$ in. long, linear or linear-oblong, obtuse and tumid at the tip, deeply concave in front, convex on the back, rather fleshy; margins ciliate-denticulate along their whole length. Leaves of young plants linear, irregularly lobulate or pinnatifid, glabrous. Flowers small, white, $\frac{1}{6}$–$\frac{1}{4}$ in. diam., usually arranged in axillary 2–4-flowered spikes near the tips of the branches, the spikes often forming a subcapitate head, more rarely the flowers are solitary and axillary. Calyx deeply 4-partite; segments linear-oblong, obtuse, margins ciliolate. Corolla-tube short; lobes 4, spreading, orbicular-oblong, obtuse, almost equal, but the dorsal one slightly broader and the anticous one slightly narrower than the others. Stamens 2 or very rarely 4; filaments very short, altogether included. Style included. Capsule exceeding the calyx, ovoid-oblong, subcompressed, seated within a cupular disc.—*Cheesem. Man. N.Z. Fl.* (1906) 527. Logania ciliolata *Hook. f. Handb. N.Z. Fl.* (1867) 737. Mitrasacme Hookeri *Buch. in Trans. N.Z. Inst.* xiv (1882) 348, t. 29, f. 1.

South Island: Nelson—Mount Arthur and Mount Owen, *T. F. C.;* Mount Mantell, Mount Buckland, *W. Townson!* Mount Franklin, *F. G. Gibbs!* Mount Percival, *T. F. C.;* Amuri, *T. Kirk!* Lake Tennyson, *R. M. Laing!* Canterbury—Arthur's Pass and Waimakariri Glacier, *T. Kirk! T. F. C., Cockayne!* Browning's Pass and Rangitata Valley, *Haast!* Mount Cook district, *T. F. C.;* Copeland Pass, *Cockayne.* Westland—Kelly's Hill, *Petrie!* Mount Alexander, *Cockayne!* Otago—Mount Alta, *Buchanan!* 3000–5500 ft. December–March.

A very remarkable and distinct species, quite unlike any other.

61. **V. tetrasticha** *Hook. f. Handb. N.Z. Fl.* (1864) 212.—A small much-branched shrub forming depressed patches 4–12 in. diam.; branches very numerous, decumbent below, erect or spreading above; branchlets acutely tetragonous with the faces more or less concave, with the leaves on $\frac{1}{12}$–$\frac{1}{10}$ in. diam., black when dry. Leaves most densely quadrifariously imbricated, opposite pairs connate at the base and forming a short ring clasping the branch, spreading above, $\frac{1}{14}$–$\frac{1}{10}$ in. long, ovate-deltoid, narrowed into a short subacute tip, thick and coriaceous, concave in front, rounded or flat on the back, not keeled; margins ciliolate. Leaves of young plants linear-spathulate, flat, spreading, ciliolate and sparsely hispid. Flowers in short 2–4-flowered spikes near the ends of the branchlets, small, $\frac{1}{8}$–$\frac{1}{6}$ in. diam., white; rhachis and peduncle villous. Calyx deeply 4-partite; segments linear-oblong, obtuse. Corolla-tube short; limb with four equal spreading rounded lobes. Stamens 2, at first included, but the filaments lengthen before the flower withers. Ovary seated in a cupular disc. Capsule twice as long as the calyx, obovoid, compressed, obtuse.—*J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 351; *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 521; *Cockayne in Trans. N.Z. Inst.* xxxi (1899) 377 (*development of seedling*); *Cheesem. Man. N.Z. Fl.* (1906) 528.

South Island: Nelson—Wairau Mountains, *W. T. L. Travers, T. F. C.*; Mount Captain, *T. Kirk!* Canterbury—Mount Torlesse, *Cockayne!* Black Range, *J. D. Enys! T. Kirk! T. F. C., Petrie! Cockayne!* Mount Burnett and Mount Arrowsmith, *Cockayne*; Hopkins River, *Haast.* 3000–6000 ft. December–March.

A well-marked plant, the only near ally of which is the following species, which may prove to be a form of it.

62. **V. quadrifaria** *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 521.—Habit, size, and general appearance of *V. tetrasticha*, but the branchlets are more slender and wiry, about $\frac{1}{15}$ in. diam. with the leaves on, tetragonous with the faces flat, not concave. Leaves most densely quadrifariously imbricated, opposite pairs very shortly connate at the base and forming a ring clasping the branch, closely appressed, $\frac{1}{18}$–$\frac{1}{16}$ in. long, broadly triangular, acute or subacute, coriaceous, concave in front, rounded on the back, not keeled; margins ciliolate towards the base or throughout their whole length. Flowers small, white, $\frac{1}{10}$ in. diam., arranged in very short axillary 2–4-flowered spikes, the spikes usually capitate at the tips of the branchlets. Calyx 4-partite almost to the base; segments linear-oblong, obtuse, ciliolate. Corolla-tube short, equalling the calyx; lobes 4, rounded, spreading. Stamens 2; filaments short. Ovary seated in a cupular disc. Capsule twice as long as the calyx, oblong-obovoid, compressed, obtuse.—*Cheesem. Man. N.Z. Fl.* (1906) 529. Mitrasacme Cheesemanii *Buch. in Trans. N.Z. Inst.* xiv (1882) 348, t. 29, f. 2.

South Island: Nelson—Mount Precival, *T. F. C.*; Mount Charon, *Cockayne!* Canterbury — Mount Peel, *H. H. Allan*; Mount Dobson, *T. F. C.* Otago — Mount Alta, *Buchanan!* 3500-6000 ft. December–March.

Very near to the preceding, from which it differs in the more slender branchlets, which are tetragonous with almost flat sides, not concave; and in the smaller leaves, which are more closely appressed, and are broadly triangular with straight edges. In *V. tetrasticha* the leaves are rather suddenly narrowed above the broad base, so that the margin is curved, not straight. The flowers and capsules are also smaller than in *V. tetrasticha*.

63. **V. tumida** *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 521.—A prostrate or decumbent much-branched plant forming broad depressed patches 6–18 in. diam.; branches very numerous, obtusely tetragonous, with the leaves on $\frac{1}{12}$–$\frac{1}{10}$ in. diam., black when dry. Leaves densely imbricated, opposite pairs connate at the base, $\frac{1}{15}$–$\frac{1}{12}$ in. long, broadly ovate-deltoid, tumid, obtuse, concave in front, rounded or obtusely keeled at the back, margins ciliolate. Flowers in 2–4-flowered abbreviated spikes at the ends of the branchlets, small, $\frac{1}{8}$–$\frac{1}{6}$ in. diam., white. Calyx deeply 4-partite; segments linear-oblong, obtuse, ciliolate. Corolla-tube short; limb with 4 nearly equal spreading oblong obtuse lobes. Stamens 2, included; anthers almost as long as the filaments. Ovary seated in a cupular disc. Capsule exceeding the calyx, subcompressed, broadly oblong, obtuse.—*Cheesem. Man. N.Z. Fl.* (1906) 529.

South Island: Nelson—Gordon's Nob and St. Arnaud Mountains, *Monro, T. F. C., H. H. Allan!* Mount Rintoul and Ben Nevis, *F. G. Gibbs!* Mount Starveall, *W. H. Bryant!* Mount Richmond, *J. H. Macmahon!* Otago — *Herb. Buchanan!* (exact locality not stated). 3000–5000 ft. December–February.

Nearest to *V. tetrasticha*, from which it is separated without any difficulty by the obtusely tetragonous branchlets, tumid obtuse leaves, and broader shorter capsule. Mr. N. E. Brown informs me that the specimens quoted in the Handbook under *V. tetragona* from Gordon's Knob (Monro) and Waiau-au Valley (Travers) in reality belong to this species.

64. **V. Astoni** *Petrie in Trans. N.Z. Inst.* xl (1908) 288.—A small much and compactly branched shrub 8–12 or 15 in. high, usually forming rounded or flattened bushes; branches stout, closely marked with the scars of the fallen leaves; ultimate branchlets slender, very closely packed, more or less obscurely tetragonous. Leaves densely quadrifariously imbricated, the opposite pairs connate at the base, $\frac{1}{20}$–$\frac{1}{12}$ in. long, almost as broad at the base, smooth and tumid on the back and scarcely keeled, obtuse and almost rounded at the tip, quite glabrous or the younger ones with the margins finely ciliate; upper surface deeply concave. Flowers 3–5, rarely more, sessile among the uppermost leaves and forming small heads, about $\frac{1}{5}$ in. diam., white. Bracts furrowed. Calyx-segments and corolla much as in *V. tetragona*. Capsule broadly oblong, exceeding the calyx.

North Island: Ruahine and Tararua Mountains, not uncommon. 4000–5000 ft. January–February.

Closely allied to *V. tetragona*, but differing in the smaller size, more depressed habit, leaves tumid and scarcely keeled on the back, and in the fewer and smaller flowers.

65. **V. tetragona** *Hook. Ic. Plant.* (1843) t. 580.—A small usually erect much-branched shrub 6 in. to 3 ft. high; stems ringed with the scars of the fallen leaves; branches stout, rigid, erect, obtusely 4-angled when adult, $\frac{1}{10}$–$\frac{1}{6}$ in. diam. Leaves most densely quadrifariously imbricated, erect, opposite pairs connate at the base, $\frac{1}{12}$–$\frac{1}{10}$ in. long, broadly deltoid-ovate, obtuse, keeled at the back, very thick and coriaceous, smooth and shining, margins and base usually ciliolate or woolly. Leaves of young plants longer than the mature ones, linear-subulate with a broad base, more or less spreading. Flowers 3–8, sessile among the uppermost leaves and forming small terminal heads, $\frac{1}{4}$–$\frac{1}{3}$ in. diam., white. Bracts conspicuously furrowed, woolly at the base. Calyx-segments unequal, linear-oblong, obtuse, furrowed. Corolla 4-lobed; lobes spreading, dorsal the largest, obovate, entire or emarginate, anticous the smallest, narrow-oblong. Capsule broadly oblong, subacute, compressed, exceeding the calyx.—*Raoul Choix* (1846) 43; *Hook. f. Fl. Nov. Zel.* i (1853) 194; *Handb. N.Z. Fl.* (1864) 211; *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 351; *Cheesem. Man. N.Z. Fl.* (1906) 580; *Ill. N.Z. Fl.* ii (1914) t. 153.

North Island: Mountain districts from Mount Hikurangi, Tongariro, and Ruapehu southwards to the Ruahine Range, abundant. 2000–5500 ft. December–February.

A very remarkable species. Flowerless specimens so closely resemble a *Podocarpus* or *Dacrydium* that Sir W. J. Hooker had a plate prepared for the "Icones Plantarum" under the name of *Podocarpus Dieffenbachii*. I have seen no specimens from the South Island, and it is now quite certain that most (if not all) of the South Island localities assigned to the species in the Handbook belong to other species.

66. **V. lycopodioides** *Hook. f. Handb. N.Z. Fl.* (1864) 211.—A stout much-branched shrub 1–4 ft. high; branches rigid, erect, clothed with densely imbricating leaves, acutely or obtusely 4-angled when adult, $\frac{1}{10}$–$\frac{1}{6}$ in. diam. Leaves dimorphic, the adult state most densely quadrifariously imbricated, the opposite pairs connate at the base, $\frac{1}{12}$–$\frac{1}{10}$ in. long, $\frac{1}{10}$–$\frac{1}{8}$ in. broad, very broadly ovate-deltoid, concave in front, keeled on the back, suddenly narrowed into a stout obtuse cusp or point, very coriaceous, smooth or more or less distinctly grooved on the back, margins glabrous or ciliolate. Leaves of young plants (frequently found by reversion on older ones as well) twice as long as the mature ones, spreading, linear-subulate with a broad base, entire or more frequently irregularly lobed or almost

pectinate-pinnatifid. Flowers crowded at the tips of the branches, forming small terminal heads, $\frac{1}{3}$ in. diam., white. Bracts furrowed, ciliolate. Calyx-segments unequal, oblong. Corolla-tube about equal to the calyx; lobes 4, spreading, the dorsal one the largest. Capsule broadly oblong, subcompressed, exceeding the calyx.—*Bot. Mag.* (1894) t. 7338; *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 351; *Cheesem. Man. N.Z. Fl.* (1906) 530; *Adamson in Journ. Linn. Soc.* xl (1912) 262.

var patula S.+T.

South Island: Mountains of Nelson and Marlborough southwards to the west of Otago, not uncommon in subalpine localities throughout. 2500–5500 ft. December–February.

Very closely allied to *V. tetragona*, from which it can only be distinguished by the more acutely 4-angled branches and rather broader leaves, which are suddenly narrowed into a bluntish cusp or point.

67. **V. Hectori** *Hook. f. Handb. N.Z. Fl.* (1864) 212.—A small robust much-branched shrub 6–30 in. high; stem woody, terete, closely ringed by the scars of the fallen leaves; branches terete or very obscurely tetragonous, stout, rigid, erect, $\frac{1}{8}$–$\frac{1}{6}$ in. diam., blackish-brown when dry. Leaves densely imbricated, opposite pairs connate to the middle or higher and forming a closely appressed ring surrounding the branch (sometimes slightly open at the mouth), $\frac{1}{10}$–$\frac{1}{8}$ in. long, broader than long, broadly orbicular-oblong, obtuse, concave in front, rounded and polished at the back, not keeled, extremely thick and coriaceous, margins of the younger leaves often ciliolate. Leaves of young plants not seen. Flowers axillary, crowded at the tips of the branchlets, forming small terminal heads, about $\frac{1}{4}$ in. diam., white. Calyx-segments linear-oblong, obtuse, ciliolate. Corolla-tube about as long as the calyx; lobes oblong, obtuse, dorsal one the largest. Capsule exceeding the calyx, broadly oblong, subcompressed, obtuse.—*Bot. Mag.* (1895) t. 7415; *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 352; *Cheesem. Man. N.Z. Fl.* (1906) 531; *Adamson in Journ. Linn. Soc.* xl (1912) 263.

South Island: Canterbury—Southern Alps, *Haast, J. B. Armstrong;* Mount Cook district, *T. F. C.* Otago—Garvie Mountains, *Poppelwell!* Mount Alta, *Hector* and *Buchanan!* Mount Tyndall and the Hector Mountains, *Petrie!* Humboldt Mountains, *Cockayne!* Haast Pass and Makarora, *Poppelwell;* Mount Jones, Hawea, *Cockayne!* Mount Earnslaw, *H. J. Matthews!* Lake Hauroko, *Crosby Smith.* 3500–6000 ft. January–March. Clyde V. Wall 4: 1935: 112

Most nearly allied to *V. lycopodioides*, but recognized without any difficulty by the terete branchlets, and by the leaves being connate to above the middle, and obtuse, not pointed. The much stouter branchlets at once separate it from *V. salicornioides* and *V. Armstrongii*.

68. **V. Laingii** *Cockayne in Rep. Bot. Stewart Id.* (1909) 44.—A small branching shrub 6–10 in. high. Main stems few, procumbent at the base, erect above, copiously branched towards the top; ultimate branchlets about 1½–2 in. long, strict, terete or obscurely tetragonous, $\frac{1}{10}$–$\frac{1}{8}$ in. diam. Leaves quadrifarious, densely imbricate in opposite pairs, connate at the base, $\frac{1}{10}$–$\frac{1}{6}$ in. long, ovate-deltoid, obtuse at the tip, tumid on the back, margins minutely ciliate. Leaves of young plants not seen. Flowers 6–8 together, forming small heads $\frac{1}{3}$–$\frac{1}{2}$ in. long at the tips of the branchlets. Calyx-lobes oblong, obtuse, equalling the corolla-tube or nearly so; margins ciliolate. Corolla white; lobes spreading, the dorsal one the largest. Ovary glabrous. Ripe capsules not seen.

Stewart Island: Subalpine meadows near the summit of Mount Anglem, alt. 2500–3200 ft., *Cockayne! R. M. Laing! W. R. B. Oliver.* January–February.

This is probably nearest to *V. Hectori* and *V. coarctata*, but is amply distinct from both. It also has some points of agreement with *V. tumida*.

Wilmott Pass; McKinnon Pass. T 75: 193

H. demissa sinb Trans 75:193 Rocky Pillar

69. **V. coarctata** *Cheesem. Man. N.Z. Fl.* (1906) 531.—A small stout much-branched shrub 1–3 ft. high; branches close, spreading; branchlets numerous, rather stout, $\frac{1}{12}$–$\frac{1}{10}$ in. diam., terete or obscurely tetragonous, densely clothed with appressed imbricating leaves, blackish when dry. Leaves of mature plants densely imbricating, about $\frac{1}{10}$ in. long, the opposite pairs connate to above the middle into a ring or sheath closely appressed to the branch, obtuse or subacute, thick and coriaceous, smooth and polished on the back; margins usually ciliolate. Leaves of young plants not seen. Flowers $\frac{1}{5}$–$\frac{1}{4}$ in. diam., white, from 4 to 8 near the tips of the branchlets, forming small terminal heads; bracts broad, ciliolate. Calyx short; segments oblong, obtuse, ciliolate. Corolla-tube included in the calyx; lobes spreading, the dorsal one the largest. Capsule about $\frac{1}{6}$ in. long, nearly twice as long as the calyx, ovoid, obtuse.

South Island: Nelson—Mount Arthur and Mount Owen, *T. F. C.*; Mount Owen and Brunner Range, *W. Townson!* 3500–5000 ft. January–March.

I described this as a new species with some hesitation. It appears to be intermediate in characters between *V. Hectori* and *V. Armstrongii*, but is much more slender and more copiously branched than the first, and from the latter it differs in being stouter, and in the shorter and broader tightly appressed leaves, which do not form the lax obconic sheaths so characteristic of *V. Armstrongii*.

70. **V. Poppelwellii** *Cockayne in Trans. N.Z. Inst.* xlviii (1916) 200.—A small slender erect much-branched shrub 6–12 in. high, rarely more; ultimate branchlets $\frac{1}{14}$–$\frac{1}{12}$ in. diam., closely packed, tetragonous, dark-brown or almost black, closely ringed by the scars of the fallen leaves. Leaves of mature plants closely quadrifariously imbricate, the opposite pairs connate at the base, broadly triangular, thick and coriaceous, keeled down the back, and with 5–6 lateral grooves on each face, obtuse or subacute at the tip, margins ciliate, with stiff white hairs. Leaves of young plants not seen. Flowers in 6–12-flowered heads near the tips of the branchlets; rhachis villous; bracts short, ciliolate. Calyx 4-partite nearly to the base; segments oblong-obovate, ciliate. Corolla white; tube short; lobes spreading, dorsal lobe the largest. Capsule obovoid, twice as long as the calyx.

South Island: Otago—Garvie Mountains, Mount Tennyson and other peaks, *Poppelwell! J. Speden! W. A. Thomson!* 4500–5500 ft.

A distinct little plant, easily recognized by its small size and strict habit, quadrifarious leaves, which are distinctly longitudinally grooved, and by the many-flowered terminal heads. I am indebted to Mr. Speden for excellent flowering and fruiting specimens.

71. **V. salicornioides** *Hook. f. Handb. N.Z. Fl.* (1864) 212.—A small much-branched shrub 1–3 ft. high; branches strict, erect, terete, clothed with imbricating leaves, $\frac{1}{14}$–$\frac{1}{12}$ in. diam., yellowish-brown when dry. Leaves most densely imbricated and appressed to the branch, opposite pairs connate to considerably above the middle and forming a ring surrounding the branch, $\frac{1}{16}$–$\frac{1}{15}$ in. long, subacute or almost truncate, concave in front, rounded at the back; margins usually ciliolate. Leaves of young plants not seen. Flowers 4–8 towards the tips of the branchlets, forming small terminal heads; rhachis villous. Bracts short and broad, ciliolate. Calyx-segments oblong, obtuse, margins ciliolate. Corolla white, $\frac{1}{4}$ in. diam.; tube short; limb 4-lobed, lobes spreading. Capsule longer than the calyx, subcompressed, oblong, obtuse, glabrous.—*J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 352; *N. E. Brown in Gard. Chron.* i (1888) 20, f. 3; *Cheesem. Man. N.Z. Fl.* (1906) 582.

SOUTH ISLAND: Nelson—Cobb Valley, *F. G. Gibbs!* Wairau Mountains, *Rough, W. T. L. Travers;* Wairau Gorge, *T. F. C.;* Mount Charon (Hanmer), *Cockayne!* Canterbury—Rangitata Valley, *Haast, J. B. Armstrong.* 2500–5000 ft. January–March.

This has been much misunderstood, the name having been erroneously applied, both in England and in the Dominion, to the plant described herein as *V. propinqua,* from which it differs in the more erect habit, in the stouter strict branches, and in the more closely placed broader and shorter leaves. My specimens gathered in the Wairau Gorge exactly match one of the type specimens collected by Travers in almost the same locality.

72. **V. Armstrongii** *Johnson in N.Z. Country Journ.* (January, 1879) 59.—A small much-branched shrub 1–3 ft. high; branches spreading, often flabellate; branchlets very numerous, slender, terete, clothed with appressed imbricating leaves, $\frac{1}{16}$–$\frac{1}{12}$ in. diam. Leaves of mature plants closely imbricating, appressed but not very closely so, about $\frac{1}{10}$ in. long, opposite pairs connate for the greater part of their length, forming a sheath investing the branch which is wider at the top than the base, and thus almost obconic in shape, truncate or nearly so at the apex, tumid and coriaceous, smooth and rounded on the back, margins usually ciliolate. Leaves of young plants (frequently produced by reversion on old ones as well) spreading, $\frac{1}{10}$–$\frac{1}{8}$ in. long, linear, acute, flat, entire or irregularly lobulate. Flowers $\frac{1}{5}$–$\frac{1}{4}$ in. diam., white, 4–8 or more towards the tips of the branchlets, forming small terminal heads; rhachis villous. Calyx-segments unequal, oblong, obtuse, ciliolate. Corolla-tube short, about equalling the calyx; lobes spreading. Capsule $\frac{1}{6}$ in. long, about twice as long as the calyx, oblong-ovoid, compressed, obtuse or slightly retuse.—*T. Kirk in Trans. N.Z. Inst.* xi (May, 1879) 464; *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 352; *Cockayne in Trans. N.Z. Inst.* xxxi (1899) 396, tt. 28, 29; *Cheesem. Man. N.Z. Fl.* (1906) 532; *Adamson in Journ. Linn. Soc.* xl (1912) 263.

SOUTH ISLAND: Mountain districts from Nelson to Otago, apparently rare and local. Upper Wairau Valley and Amuri, *T. Kirk!* Upper Rangitata, *J. B. Armstrong!* Kurow Mountains, *Petrie!* 2500–4500 ft. December–February.

Closely allied to *V. Hectori* and *V. salicornioides,* from both of which it differs in the more spreading and much more copiously branched habit, and especially in the leaves, which are connate into an almost obconic sheath which is free from the branch at the tip, and truncate, or nearly so. Very rare in the wild state, but quite common in cultivation, where it varies considerably, producing leaf-sheaths much longer than any wild specimens I have seen.

73. **V. annulata** *Cockayne in N.Z. Plants and their Story* (1919) 192.—A small much-branched shrub with much of the habit of *V. Armstrongii,* but the main branches are stouter, shorter, and more copiously divided, and the ultimate branchlets are shorter and much more closely packed. Branchlets $\frac{1}{16}$ in. diam., slender, terete; bark dark-brown. Leaves in opposite pairs, $\frac{1}{18}$–$\frac{1}{16}$ in. long, the margins connate for nearly the whole of the length, thus forming a short sheath or cup surrounding the branch, and which more closely invests it than in *V. Armstrongii;* margins of the cup quite truncate, sparsely ciliate. Inflorescence much as in *V. Armstrongii.*—V. Armstrongii *var.* annulata *Petrie in Trans. N.Z. Inst.* xlv (1913) 273.

SOUTH ISLAND: Southland, rock-faces on the northern slope of the Takitimu Mountains, alt. 3000 ft., *Cockayne! Petrie!*

Doubtless closely allied to *V. Armstrongii,* but differs in its much more dwarfish habit of growth, and tight-fitting leaf-sheaths, with their truncate margins.

74. **V. propinqua** *Cheesem. Man. N.Z. Fl.* (1906) 583.—A small much-branched shrub 1–3 ft. high; branches spreading, sometimes decumbent or tortuous; branchlets numerous, slender, about $\frac{1}{20}$ in. diam. Leaves of mature plants densely imbricated, the opposite pairs connate for the greater part of their length, each pair forming a closed sheath round the branch $\frac{1}{10}$–$\frac{1}{8}$ in. long, the lower part of which is adnate to the branch, the upper part free and somewhat expanded, the free tips of the leaves very short, obtusely triangular, thick and coriaceous; margins ciliolate. Leaves of young plants free, linear or spathulate, entire or irregularly lobulate-pinnatifid. Flowers $\frac{1}{5}$–$\frac{1}{4}$ in. diam., white, 4–8 near the tips of the branchlets, forming small terminal heads; rhachis villous. Calyx small; segments linear-oblong, obtuse, ciliolate. Corolla-tube about equalling the calyx; lobes spreading, unequal, the dorsal the largest. Capsule nearly twice as long as the calyx, about $\frac{1}{8}$ in. long, ovoid, compressed, obtuse.—V. salicornioides *Hort.* (*not of Hook. f.*). V. cupressoides *var.* variabilis *N. E. Brown in Gard. Chron.* i (1888) 20, f. 5 (*exclude F*).

Var. **major** (*Cockayne*) *n. var.*—Much taller and stouter and more erect.

South Island: Otago—Upper Waipori and Maungatua, *Petrie!* various stations in eastern Otago, *H. J. Matthews!* Var. *major:* Not uncommon in the uplands of Otago, *Cockayne!* 2500–5000 ft. December–February.

This has been cultivated in gardens for many years under the name of *V. salicornioides*, from which, however, it is altogether distinct, as was first pointed out by Mr. N. E. Brown in the *Gardeners' Chronicle*. It was referred by Mr. Brown to *V. cupressoides*, but it differs from that plant in size, mode of growth, leaves, and in the flowers and capsule, and Mr. Brown now agrees with me in considering it to be a distinct species. Its nearest affinity is with *V. Armstrongii*, but the branches are much more slender, and the leaves smaller and narrower.

75. **V. cupressoides** *Hook. f. Handb. N.Z. Fl.* (1864) 212.—A much and closely branched round-topped shrub 3–6 ft. high; branches divaricating; branchlets numerous, green, very slender, $\frac{1}{30}$ in. diam. or less, terete, very minutely puberulous or glabrous, clothed with decussate scale-like leaves resembling those of a cypress. Leaves of mature plants in rather remote pairs, considerably shorter than the internodes, $\frac{1}{20}$–$\frac{1}{15}$ in. long, not broader than the branch, ovate-oblong, obtuse, opposite pairs connate at the base, appressed or patent, rather fleshy, glabrous or minutely ciliolate. Leaves of young plants (often produced by reversion on the branches of old ones) $\frac{1}{10}$–$\frac{1}{4}$ in. long, linear-oblong or oblong to oblong-spathulate, acute, narrowed into short free petioles, entire or irregularly lobulate or pinnatifid. Flowers small, $\frac{1}{8}$–$\frac{1}{6}$ in. diam., pale bluish-purple or rarely white, sessile or nearly so, 3–8 near the tips of the branchlets, forming small terminal heads. Calyx unequally 4-lobed; lobes short, oblong, obtuse. Corolla-tube very short; lobes spreading, dorsal the largest, oblong-obovate, anticous the smallest, linear-oblong. Capsule small, $\frac{1}{12}$ in. long, about twice as long as the calyx, linear-obovoid or narrow cuneate-obovoid, retuse at the tip.—*J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 351; *N. E. Brown in Gard. Chron.* i (1888) 20, tt. 4, 6; *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 520; *Cheesem. Man. N.Z. Fl.* (1906) 520; *Ill. N.Z. Fl.* ii (1914) t. 154; *Adamson in Journ. Linn. Soc.* xl (1912) 264.

South Island: Nelson—Upper Wairau Valley, *Sinclair, T. F. C.;* Lake Tennyson, *T. F. C., R. M. Laing!* Fowler's Pass and Stanley River, *T. Kirk!* Waiau Valley, *W. T. L. Travers!* Marlborough—Inland Kaikouras, *Cockayne.* Canterbury—Broken River basin, *J. D. Enys! T. Kirk! T. F. C.;* Ashburton Valley and Harper's Pass,

Haast! Mount Arrowsmith, *Cockayne.* Otago—Lindis Pass and Lake district, *Hector* and *Buchanan!* Lammerlaw Hills, *Petrie!* Upper Ahuriri Valley, *Cockayne!* 2000–4500 ft. December–February.

A very remarkable species, easily distinguished by its cypress-like appearance, very slender branchlets, small scale-like leaves in remote pairs, and small narrow obovoid capsules.

76. **V. Haastii** *Hook. f. Handb. N.Z. Fl.* (1864) 213.—A prostrate or decumbent much or sparingly branched glabrous shrub, black when dry; stems woody, tortuous, 4–12 in. long; branches ascending, densely uniformly leafy, obscurely tetragonous, $\frac{1}{3}$–$\frac{2}{3}$ in. diam. with the leaves on. Leaves closely quadrifariously imbricated, opposite pairs connate at the very base, spreading or suberect, $\frac{1}{4}$–$\frac{1}{2}$ in. long, broadly oblong to obovate, obtuse, concave in front, not keeled at the back, fleshy when fresh, extremely coriaceous and rigid when dry; margins ciliate at the very base. Flowers small, white, most densely compacted in terminal ovoid heads $\frac{1}{2}$–$1\frac{1}{2}$ in. long, formed of numerous reduced spikes in the axils of leafy bracts. Bracts oblong or ovate-oblong, about equalling the calyx. Calyx 4-partite; segments linear-oblong, obtuse. Corolla-tube longer than the limb, rather shorter than the calyx; limb exserted, $\frac{1}{6}$ in. diam., 4-lobed; lobes ovate, subacute. Capsule about equalling the calyx, ovoid-oblong, acute.—*J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 350; *Cheesem. Man. N.Z. Fl.* (1906) 534.

Var. **macrocalyx** *Cheesem. Man. N.Z. Fl.* (1906) 534.—Much more copiously branched, prostrate and trailing, brown when dry. Leaves $\frac{1}{3}$–$\frac{2}{3}$ in. long, obovate or broadly obovate-spathulate, obtuse, bright-green and fleshy when fresh. Bracts lanceolate or linear, acute. Calyx-segments linear, obtuse or subacute, almost equalling the corolla. Corolla-tube longer than the narrow limb.—V. macrocalyx *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 353.

South Island: Nelson—Mount Arthur, *T. F. C.;* Lake Tennyson, *R. M. Laing!* Canterbury—Mount Torlesse and Mount Dobson, *Haast, T. F. C.;* mountains above the Broken River, *J. D. Enys! T. F. C.;* Mount Darwin and Mount Cook, *Haast.* Var. *macrocalyx:* Mount Rolleston and Waimakariri Glacier, *J. B. Armstrong! T. F. C., Cockayne!* Browning's Pass, *Cockayne;* Rangitata Valley, *J. B. Armstrong.* 3500–6500 ft. December–February.

A well-marked species. The var. *macrocalyx* principally differs in its more branched and trailing habit, longer and narrower leaves, which are not so coriaceous when dry, longer and narrower bracts and calyx-segments, and shorter narrower corolla. Mr. N. E. Brown is inclined to treat it as a distinct species, but it appears to me to be connected with the type by intermediate forms.

77. **V. epacridea** *Hook. f. Handb. N.Z. Fl.* (1864) 213.—A small much-branched prostrate or decumbent rigid shrub; stems woody, tortuous, 3–12 in. long; branches curved, ascending at the tips, densely leafy, obscurely tetragonous, $\frac{1}{4}$–$\frac{1}{2}$ in. diam. with the leaves on, glabrous or pubescent above. Leaves closely quadrifariously imbricated, opposite pairs connate at the base, spreading and recurved, $\frac{1}{8}$–$\frac{1}{4}$ in. long, broadly oblong or obovate-oblong, obtuse or subacute, concave in front, keeled at the back, rigid, very coriaceous; margins usually red, thickened, ciliate towards the base. Flowers small, white, densely packed in terminal ovoid heads $\frac{1}{2}$–1 in. long, formed of numerous reduced spikes in the axils of leafy bracts. Bracts obovate or ovate to linear-obovate, ciliate. Calyx deeply 4-partite, segments unequal, linear-oblong, obtuse, ciliate. Corolla-tube long, narrow, equalling the calyx; limb small, $\frac{1}{8}$ in. diam., 4-lobed; lobes ovate, acute, spreading or recurved. Capsule small, ovoid-oblong, exceeding the calyx.—*J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 350; *Cockayne*

H. ramosissima S+T. 72:29.

in Trans. N.Z. Inst. xxxi (1899) 380 (*development of seedling*); *Cheesem. Man. N.Z. Fl.* (1906) 535; *Ill. N.Z. Fl.* ii (1914) t. 155; *Adamson in Journ. Linn. Soc.* xl (1912) 262.

South Island: Nelson—Gordon's Knob, Mount Arthur and Mount Peel, mountains above the Wairau Gorge, *T. F. C.*; Tarndale, *Sinclair*; mountains flanking the Clarence and Waiau Valleys, *W. T. L. Travers, T. Kirk! T. F. C.* Marlborough—Awatere Mountains, *Cockayne.* Canterbury—Mount Torlesse and Broken River basin, *J. D. Enys! T. Kirk! T. F. C., Cockayne!* Ashburton Valley, Godley Glacier, Mount Darwin, *Haast*; Upper Rakaia and Mount Arrowsmith, *Cockayne!* Mount Dobson, *T. F. C.*; Cass River, *Cockayne* and *Foweraker.* Otago—Mount Arnould, *Petrie!* Garvie Mountains, *Poppelwell.* 3000–6500 ft. December–February.

Very close to *V. Haastii*, and there are forms which are quite intermediate, but in the usual state it is easily separated by the smaller size, sharply recurved leaves, and ciliate bracts and calyx-segments.

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78. **V. Petriei** *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 517.—A decumbent or prostrate sparingly branched woody little plant; branches ascending, 3–6 in. long. Leaves not close-set, spreading, ¼–½ in. long, oblong or linear-oblong, rounded at the apex, narrowed into a short broad petiole, flat, slightly coriaceous, glabrous or the margins minutely glandular-ciliate; the opposite petioles connate at the base and forming a short sheath clasping the branch. Flowering branches clothed with numerous erect linear or linear-lanceolate foliaceous obtuse bracts, each branch ending in a narrow-oblong many-flowered spiciform head ½–1½ in. long. Flowers small, ⅛–⅙ in. diam., solitary and sessile in the axils of the bracts, which slightly exceed the calyx. Calyx deeply 4–5-partite; segments very unequal in size, linear, obtuse, minutely ciliate. Corolla hardly exceeding the calyx; tube cylindrical, longer than the limb, which is 4-lobed, the lobes spreading or reflexed. Stamens included. Capsule small, oblong, turgid.—*Cheesem. Man. N.Z. Fl.* (1906) 535. Mitrasacme Petriei *Buch. in Trans. N.Z. Inst.* xiv (1882) 349, t. 30, f. 1.

T. 71:91.

South Island: Otago—Mount Bonpland, *Petrie!* Bold Peak, near Kinloch, *B. C. Aston!* Routeburn and mountains above Lake Harris, *H. J. Matthews! Poppelwell*; Garvie Mountains, *J. Speden! Poppelwell*; Takitimu Mountains, *Crosby Smith, Cockayne.*

A most distinct little plant, not nearly allied to any other. The crowded linear bracts are a very remarkable character.

79. **V. dasyphylla** *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 519.—A prostrate rigidly coriaceous woody little plant. Stems much branched, 2–6 in. long; branches short, 1–2 in. high, ascending or erect, pubescent, densely leafy, tetragonous, ¼ in. diam. with the leaves on. Leaves closely quadrifariously imbricate, opposite pairs connate at the base and forming a short ring clasping the stem, spreading above, ⅛–⅙ in. long, oblong or oblong-obovate, obtuse, very coriaceous, concave in front, rounded or obscurely keeled at the back; margins ciliate towards the base, cartilaginous above. Flowers large, ⅓–½ in. diam., solitary at the tips of the branchlets, sessile. Calyx 5-partite; segments oblong, obtuse, hispid-pubescent towards the base, margins ciliate. Corolla-tube short, broad; limb with 5 large rounded spreading lobes. Stamens 2; filaments short; anthers large, included. Ovary seated in a cupular disc. Capsule altogether included in the calyx, oblong, turgid, coriaceous, 4-valved.—*Cheesem. Man. N.Z. Fl.* (1906) 536. Logania tetragona *Hook. f. Handb. N.Z. Fl.* (1864) 188, 737; *Buch. in Trans. N.Z. Inst.* xiv (1882) 347, t. 28, f. 2. T. 71:91.

var. minor S+T 72:30 Mt. St. Mary
" subacuta " " " Rough Peaks } Trans.

SOUTH ISLAND: Otago—Lake district, Mount Alta, sounds of the west coast, *Buchanan!* Old Man Range, Mount Pisa, Ben Lomond, Mount Bonpland, *Petrie!* Cecil Peak, Lake Wanaka, Mount Cardrona, Mount Dick, *Cockayne!* Garvie Mountains, *Poppelwell, W. A. Thomson! J. Speden!* Mount Kyeburn, *B. C. Aston!* 3500–6000 ft. January–March.

A very peculiar species, remarkable for the large terminal flower and 5-lobed calyx and corolla. Sir J. D. Hooker gives the number of stamens as 5, but all the flowers that I have examined are diandrous, and Kirk and Buchanan make the same statement.

80. **V. uniflora** (*T. Kirk*) *in Trans. N.Z. Inst.* xxviii (1896) 522.—A small rigid prostrate little plant, much and closely branched; branches ascending or erect, ½–1½ in. long, tetragonous, ⅙ in. diam. with the leaves on. Leaves densely quadrifariously imbricated, opposite pairs connate at the base, ovate-oblong, obtuse, very coriaceous, concave, margins ciliate below. Flowers solitary, terminal, ¼ in. diam. Calyx 5-partite; segments linear-oblong, obtuse, hispid-glandular throughout. Corolla 5-lobed; lobes rounded, spreading. Stamens 2, included. Ovary villous at the top. Capsule included in the calyx.—*Cheesem. Man. N.Z. Fl.* (1906) 536. Logania Armstrongii *Buch. in Trans. N.Z. Inst.* xiv (1882) 347, t. 28, f. 3.

SOUTH ISLAND: Otago—Hector's Col, Mount Aspiring, *Buchanan* and *McKay!* Garvie Mountains, *Poppelwell;* Hector Mountains, *J. Speden!* 5000–6000 ft.

Possibly only a small state of *V. dasyphylla*, but I have seen only very indifferent specimens.

81. **V. macrantha** *Hook. f. Handb. N.Z. Fl.* (1864) 213.—A short stout sparingly branched erect shrub 1–2 ft. high; branches erect or spreading, rigid, terete or obscurely tetragonous, glabrous or faintly puberulous above. Leaves ½–1 in. long, obovate-lanceolate to obovate or broadly oblong-ovate, obtuse or acute, narrowed into a short stout petiole, obtusely serrate, very thick and coriaceous, smooth, flat, glossy, margins thickened. Racemes few or many, axillary, 3–8-flowered; peduncle slender, usually longer than the leaves; bracts narrow-lanceolate. Flowers large, ¾ in. diam., pure-white; pedicels shorter than the calyx. Calyx deeply 4-partite; segments lanceolate, acuminate, coriaceous, ¼–⅓ in. long. Corolla-tube short; lobes 4, broad, rounded. Capsule broadly ovoid, acute, equalling or slightly exceeding the calyx-segments.—*J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 350; *Cheesem. Man. N.Z. Fl.* (1906) 537; *Ill. N.Z. Fl.* ii (1914) t. 156.

SOUTH ISLAND: Alpine grassy slopes from Mount Arthur (Nelson) to Lake Te Anau (Otago), chiefly in the central chain of mountains. 2500–5000 ft. December–February.

One of the most distinct species of the genus, easily recognized by the sparingly branched rigid habit, very coriaceous toothed leaves, and large pure-white flowers. Specimens from Mount Arthur and other parts of the Nelson District have shorter broader leaves, more numerous racemes, and smaller flowers than is usual in Canterbury and Otago, and may be distinguished as var. *brachyphylla* (Man. N.Z. Fl. (1903) 537).

82. **V. Benthami** *Hook. f. Fl. Antarct.* i (1844) 60, tt. 39, 40.—An erect branching shrub 2–4 ft. high; branches stout, ringed with the scars of the fallen leaves, naked below, leafy above, younger ones bifariously pubescent. Leaves crowded towards the ends of the branches, sessile, opposite pairs connate at the very base, ½–1½ in. long, linear-oblong to obovate-oblong, obtuse, narrowed to the base, flat, coriaceous, veinless,

See H. formosa (R.Br.) Cheesem. Trans 60 : 1929 : 470. (Tasmania?)

entire or with a few coarse serratures above the middle, margins with a line of white down. Racemes terminating the branches, elongated, 1½–3 in. long, many-flowered, clothed with numerous leafy imbricating bracts ¼–½ in. long. Flowers pedicelled, not exceeding the bracts, ⅓–½ in. diam., bright-blue. Calyx deeply 5-partite ; segments unequal, oblong-spathulate, margined with white down. Corolla-tube shorter than the calyx ; limb 5-lobed, more rarely 3–6-lobed ; lobes obovate, obtuse. Stamens 2, rarely 3, short, included. Capsule broadly ovoid, acute, about as long as the calyx.—*Handb. N.Z. Fl.* (1864) 214 ; *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 350 ; *Cheesem. Man. N.Z. Fl.* (1906) 537 ; *Subantarctic Is. N.Z.* ii (1909) 425. V. finaustrina *Homb. and Jacq. Voy. au Pôle Sud. Dicot.* (1853) t. 9, fig. *y*.

Auckland and Campbell Islands : Rocky places, abundant, *Hooker, T. Kirk ! Chapman ! H. J. Matthews*, and others. December–February.

A very distinct and beautiful plant, excellently figured in the "Flora Antarctica." As pointed out by Hooker, abnormal flowers are frequently seen in which the corolla is 6-lobed, with 3 stamens and a 3-celled ovary. Other flowers have a 3-lobed corolla, but with the usual number of stamens and a 2-celled ovary.

83. **V. erecta** *T. Kirk in Trans. N.Z. Inst.* xxviii (1896) 517.—A sparingly branched shrub 6–18 in. high ; branches few, slender, strict, erect, terete, sparingly leafy, puberulous above. Leaves in distant pairs, spreading, sessile, ¾–1 in. long, oblong-lanceolate or obovate-lanceolate, acute, entire or obscurely toothed, subcoriaceous, margins minutely puberulous or ciliate. Racemes 2–6, solitary in the axils of the upper leaves, 3–4 in. long, strict, erect, naked below ; rhachis pubescent, as are the bracts and short pedicels. Flowers about ⅕ in. diam., often obscurely fascicled or whorled. Calyx deeply 4-partite ; segments ovate-oblong, acute, ciliate. Corolla-tube short and broad, shorter than the large spreading limb ; lobes 4, broadly ovate, acute. Stamens long, exserted ; anthers large, broadly ovate. Immature capsule exceeding the calyx, compressed, oblong, acute.—*Cheesem. Man. N.Z. Fl.* (1906) 538.

Cheesem. & Hort. Trans 60: 1929: 470.

South Island : Otago—Said to have been collected on Mount Bonpland, but exact locality doubtful.

A species founded on cultivated specimens sent to Mr. Kirk by Mr. Martin, of the Fairfield Gardens, near Dunedin. It does not seem to be closely allied to any other New Zealand species, and its strict erect habit and elongated racemes give it a very peculiar appearance. For the present I place it near to *V. Hulkeana*, but more specimens are required before its exact position can be determined.

84. **V. Hulkeana** *F. Muell. ex Hook. f. Handb. N.Z. Fl.* (1864) 213. —A slender erect laxly branched shrub 1–3 ft. high ; branches spreading, sparingly leafy, terete, puberulous above. Leaves in remote pairs, spreading, 1–2 in. long, broadly ovate or oblong-ovate, obtuse or acute, obtusely or acutely coarsely serrate, rather fleshy when fresh, dark-green and shining, petiole ¼–½ in. long. Panicle slender, terminal, much branched, 6–12 in. long by 2–6 in. broad, finely pubescent ; branches opposite, the lower ones again compound ; bracts minute, ⅕ in. long, broadly ovate, obtuse, ciliate. Flowers very numerous, small, sessile, ⅕–¼ in. diam., pale-lilac. Calyx rather narrow, 4-partite ; segments ovate, obtuse, ciliate. Corolla-tube very short ; lobes 4, rounded. Stamens 2 ; anthers broadly ovate, yellow. Capsule small, oblong, obtuse, twice as long as the calyx. —*Hook. f. in Bot. Mag.* (1864) t. 5484 ; *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 350 ; *Cheesem. Man. N.Z. Fl.* (1906) 558 ; *Adamson in Journ. Linn. Soc.* xl (1912) 266.

Var. **oblonga** (*T. Kirk*) *in Trans. N.Z. Inst.* xxviii (1896) 518.—Leaves narrow-oblong, 1–3 in. long including the petiole.

Var. **Fairfieldii** *T. Kirk l.c.*—Smaller and stouter. Leaves smaller, seldom more than 1 in. long, crenate-dentate, with reddish margins. Panicle shorter and broader. Calyx-segments narrower, linear-oblong, pubescent.—V. Fairfieldii *Hook. f. Bot. Mag.* (1893) t. 7323.

South Island: Marlborough—Lower Wairau, *W. T. L. Travers, Monro;* Macrae's Run, *Monro;* Awatere Valley, *J. H. Macmahon! T. Kirk!* Kaikoura Mountains, *Sinclair, Buchanan! T. Kirk!* Canterbury—Hills in the northern part of the province, *J. B. Armstrong!* Var. *oblonga:* Marlborough—Awatere Valley, *T. Kirk! J. H. Macmahon!* Mount Fyffe, *Cockayne!* Sea-level to 3000 ft. November–December.

A handsome species, better known in cultivation than in a wild state. Mr. H. J. Matthews informs me that the var. *Fairfieldii*, which was described as a distinct species by Hooker, originally appeared in the Fairfield Gardens, near Dunedin, where many species of *Veronica* are cultivated, and has never been found in a wild state. It is probably a hybrid between *V. Hulkeana* and *V. Lavaudiana*.

85. **V. Lavaudiana** (*Raoul*) *Choix* (1846) 16, t. 10.—A small sparingly branched shrub 3–9 in. high; branches rather stout, decumbent at the base, then erect, leafy, terete, glabrous below, puberulous above. Leaves rather crowded, spreading, ⅓–1 in. long, broadly obovate or obovate-spathulate, rounded at the tip, gradually narrowed into a short stout petiole, crenate-serrate, very coriaceous, dark-green usually margined with red. Spikes short, ¼–¾ in. long, arranged in a broad hemispherical many-flowered corymb sometimes 2 in. diam. or more; peduncle rather long, erect, and with the pedicels glandular-pubescent; bracts ovate or ovate-lanceolate, pilose and ciliate. Flowers small, sessile, ¼–⅓ in. diam. Calyx 4-partite; segments ovate-lanceolate, acuminate, pubescent. Corolla-tube rather longer than the calyx; lobes 4, spreading, unequal, obtuse. Capsule exceeding the calyx, oblong, obtuse, pubescent.—*Hook. f. Fl. Nov. Zel.* i (1853) 195; *Handb. N.Z. Fl.* (1864) 539; *Bot. Mag.* (1891) t. 7210; *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 350; *Cheesem. Man. N.Z. Fl.* (1906) 539; *Adamson in Journ. Linn. Soc.* xl (1912) 266.

South Island: Canterbury—Abundant in rocky places on Banks Peninsula, *Raoul, Lyall,* &c.; river-beds of the Canterbury Plains, rare, *Lyall, W. T. L. Travers, J. B. Armstrong!* Sea-level to 2500 ft. November–December.

It is somewhat doubtful if this occurs at the present time on the Canterbury Plains, but I have seen a specimen of old date labelled from thence.

86. **V. Raoulii** *Hook. f. Handb. N.Z. Fl.* (1864) 214.—A stout much-branched woody little shrub 4–12 in. high; branches often procumbent below, terete, ringed with the scars of the fallen leaves, leafy above, pubescent. Leaves spreading or suberect, ⅓–¾ in. long, oblong-spathulate, obtuse or acute, gradually narrowed into a rather long petiole, crenate-serrate, very thick and coriaceous, yellow-green, flat, veinless. Spikes very short, either arranged in a broad terminal panicle or corymb 1–2 in. across, or forming smaller lateral corymbs or heads; peduncles and pedicels puberulous; bracts ovate, ciliolate. Flowers small, sessile, ⅕–¼ in. diam. Calyx 4-partite; segments ovate-oblong, obtuse, ciliolate. Corolla-tube short; lobes 4, broadly oblong, rounded. Capsule exceeding the calyx, oblong, obtuse.—*J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 350; *Cockayne in Trans. N.Z. Inst.* xxxi (1899) 379 (*development of seedling*); *Cheesem. Man. N.Z. Fl.* (1906) 539.

H. pauciflora / Trans. 75:194 Paringa Peak : Wilmott Pass

South Island: Nelson—Upper Wairau, *W. T. L. Travers, Monro;* Upper Clarence, Jollie's Pass, Jack's Pass, *T. F. C.;* Waiau Valley, *T. Kirk!* Lake Tennyson, *R. M. Laing!* Marlborough—Awatere Valley, abundant, *Cockayne.* Canterbury—Banks Peninsula, *Raoul, J. B. Armstrong!* Kowai River, *Haast, Petrie!* Broken River basin, *J. D. Enys! T. Kirk! Cockayne! T. F. C.* 500–3500 ft. October–November.

P.

87. **V. pulvinaris** *Hook. f. and Benth. Gen. Plant.* ii (1876) 964.—A small densely tufted hoary moss-like plant, forming soft rounded cushions 1–3 in. diam.; branches closely compacted, $\frac{1}{8}$ in. diam. Leaves very densely imbricate, $\frac{1}{10}$ in. long, linear-oblong or linear-spathulate, obtuse or subacute, not coriaceous, quite entire, the margins and both surfaces above the middle hispid with copious long white hairs. Flowers terminal, solitary, very shortly pedicelled, about $\frac{1}{8}$ in. long, white. Calyx deeply 5-partite; segments linear, ciliate. Corolla salver-shaped; tube narrow, slightly longer than the calyx; limb flat, spreading, 5-lobed. Stamens included; filaments very short. Ovary pilose at the tip. Capsule not seen.—*Cheesem. Man. N.Z. Fl.* (1906) 540. Pygmaea pulvinaris *Hook. f. Handb. N.Z. Fl.* (1864) 217; *Ic. Plant.* (1867) t. 1047; *Buch. in Trans. N.Z. Inst.* xiv (1882) 352, t. 32, f. 2.

South Island: Mountains of Nelson, Marlborough, and Canterbury, abundant. 3500–6500 ft.

This and the two following species differ from *Veronica* in the 5- or 6-partite corolla and in the leaves not being quadrifariously arranged, and constituted the genus *Pygmea* of the Handbook. In the "Genera Plantarum" the genus was reduced to a section of *Veronica*, and this view has also been followed by Wettstein in "Die Naturlichen Pflanzenfamilien."

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88. **V. Thomsoni** *Cheesem. Man. N.Z. Fl.* (1906) 540.—Very similar in most respects to *V. pulvinaris*, but rather larger and stouter. Leaves very densely imbricate, $\frac{1}{10}$ in. long, rhomboid-obovate or obovate-oblong, obtuse or subacute, somewhat thick and fleshy towards the tip, membranous towards the base, quite entire, usually copiously hispid on the margins and back above the middle, upper surface often glabrous. Flowers solitary, terminal, rather larger than in *V. pulvinaris*. Calyx deeply 5-partite; segments linear, obtuse, ciliate. Corolla-tube much longer than the calyx; limb spreading, 5-lobed. Stamens included; filaments very short. Ovary pilose at the tip. Capsule narrowly obcordate, turgid, about as long as the calyx.—Pygmaea Thomsoni *Buch. in Trans. N.Z. Inst.* xiv (1882) 353, t. 32, f. 3.

Var. **glabra** *Cheesem. l.c.*—Glabrous, or with a few scattered hairs on the margins of the leaves.

South Island: Otago—Mount Alta, *Buchanan* and *McKay!* Kurow Mountains, Mount St. Bathan's, Mount Pisa, *Petrie!* Eyre Mountains and Garvie Mountains, *Poppelwell.*

Very near to *V. pulvinaris*, but the leaves are broader and the corolla larger, with a much longer tube. It is easily confounded with *Myosotis pulvinaris.*

Pygmaea

89. **V. ciliolata** *Hook. f. and Benth. Gen. Plant.* ii (1876) 964.—A small densely tufted moss-like plant, forming rounded cushions 1–3 in. diam.; branches rather stout, $\frac{1}{2}$–1 in. high, rarely more, with the leaves on $\frac{1}{5}$–$\frac{1}{4}$ in. diam. Leaves densely imbricate, $\frac{1}{8}$ in. long, broadly obovate-spathulate, rounded at the tip, coriaceous, quite entire, both services glabrous or nearly so, margins ciliate from below the middle with long stiff white hairs. Flowers solitary, terminal, sessile or nearly so, $\frac{1}{10}$–$\frac{1}{8}$ in. long,

H. dilatata S+T Trans 73:164 Parahebe Oliv. Rec. D.M. 1-229
H. murrellii " " 165
H. pauciflora " " 166

white. Calyx deeply 5-partite; segments linear-spathulate, ciliate. Corolla salver-shaped; tube cylindrical, rather longer than the calyx; limb flat, spreading, 5- or rarely 6-lobed; lobes oblong, obtuse. Stamens usually included; filaments short; anthers large. Ovary glabrous. Capsule not seen.—*Cheesem. Man. N.Z. Fl.* (1906) 540. Pygmea ciliolata *Hook. f. Handb. N.Z. Fl.* (1864) 217; *Ic. Plant.* (1871) t. 1047; *Buch. in Trans. N.Z. Inst.* xiv (1882) 352, t. 32, f. 1.

South Island: Nelson—Discovery Peaks, *W. T. L. Travers.* Canterbury—Mount Sebastopol, Mount Cook district, *T. F. C.*; Hopkins River, *Haast.* Otago—Mount Alta and Hector's Col, *Buchanan!* Garvie Mountains, *Poppelwell.* 5000–6500 ft.

Distinguished from the two preceding by the stouter branches and more coriaceous broader leaves, ciliate on the margins only. When dry the margins of the leaves are incurved, the hairs all pointing inwards.

90. **V. loganioides** *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 359.—A dwarf shrub 6–14 in. high; stems woody, decumbent at the base, erect above; branches numerous, slender, terete, leafy above, ringed with the scars of the fallen leaves below, pubescent or almost villous with lax soft greyish-white hairs. Leaves decussate, in rather close-set opposite pairs, erecto-patent, sessile, $\frac{1}{8}$–$\frac{1}{6}$ in. long, ovate-lanceolate, acute, entire or sometimes with 1 or 2 small teeth on each side, dull-green, coriaceous, keeled. Racemes near the tips of the branches, forming a small corymb-like head, short, few-flowered, rhachis and pedicels pubescent or almost villous. Flowers $\frac{1}{4}$ in. diam., white or white with pink veins. Calyx deeply 4-partite; segments ovate-oblong, acute, ciliolate. Corolla-tube broad and short, not equalling the calyx; limb 4-lobed; dorsal and lateral lobes subequal, orbicular-oblong, obtuse; anticous lobe narrower, oblong. Capsule elliptical-oblong, didymous, turgid, notched at the tip, rather shorter than the calyx.—*Hook. f. Bot. Mag.* (1895) t. 7404; *Cheesem. Man. N.Z. Fl.* (1906) 541; *Adamson in Journ. Linn. Soc.* xl (1912) 262.

See Wall Rec. C.M. 4:1935:102

South Island: Canterbury—Rangitata Valley, *J. B. Armstrong!* Clyde Valley, *W. Gray.*

A very remarkable plant, of dubious affinity, quite unlike any other. Mr. Kirk has pointed out that the capsule is didymous, with the septum across the narrowest diameter; and the short tube of the corolla and large rounded lobes also show a relationship to the herbaceous section of the genus. But the habit of the plant, with its woody stems and small close-set leaves, is nearer that of the section including *V. lycopodioides* and its allies. Mr. Armstrong's original description is by no means characteristic of the specimens cultivated by him in the Christchurch Botanical Gardens.

H. Allan Alpine 1944: 230

91. **V. linifolia** *Hook. f. Handb. N.Z. Fl.* (1864) 214.—A small much and diffusely branched procumbent herb; branches slender, often rooting below, ascending at the tips, terete, glabrous, 2–9 in. long or more. Leaves numerous, closely placed, spreading, $\frac{1}{3}$–1 in. long, $\frac{1}{10}$–$\frac{1}{6}$ in. broad, linear, obtuse at the tip, narrowed into a rather long broad petiole, flat, subcoriaceous, quite entire; margins of petiole ciliate. Racemes 1–3 towards the ends of the branches, 1–2 in. long, slender, naked below, 2–5-flowered; bracts $\frac{1}{8}$–$\frac{1}{3}$ in. long, linear, obtuse; pedicels long, $\frac{1}{4}$–1 in., slender, curved. Flowers large, $\frac{1}{3}$–$\frac{1}{2}$ in. diam., white or pale-rose. Calyx $\frac{1}{6}$ in. long, deeply 4-partite; segments linear-oblong, obtuse. Corolla-tube very short; limb broad, spreading, 4-lobed; lobes broad, rounded, veined. Stamens equalling the corolla-lobes. Capsule broadly obcordate, rather

shorter than the calyx.—*J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 349; *Cheesem. Man. N.Z. Fl.* (1906) 542; *Adamson in Journ. Linn. Soc.* xl (1912) 272.

South Island: Nelson—Mount Owen, *W. Townson!* Mount Franklin, *Park;* Lake Tennyson, *T. F. C., R. M. Laing.* Canterbury—Broken River, *Petrie!* Craigieburn Mountains, *Cockayne;* Upper Waimakariri, *J. D. Enys! T. F. C.;* Ashburton Mountains, *Potts!* Clyde Glacier and Mount Darwin, *Haast.* Westland—Otira Valley, *T. F. C.;* Okarito, *A. Hamilton.* Otago—Lake Wanaka, *Buchanan!* mountains near Arrowtown, *Petrie!* Eyre Mountains and Routeburn, *Poppelwell;* Haast Pass, *Poppelwell.* 1500–4500 ft. December–January.

A very distinct and well-marked plant.

92. **V. catarractae** (*Forst. f.*) *Prodr.* (1786) n. 9.—Stems slender, terete, sparingly branched, suberect, or prostrate below and then ascending, 6–24 in. long, glabrous or bifariously pubescent, woody at the base. Leaves rather distant, shortly petiolate, spreading, 1–4 in. long, lanceolate or ovate-lanceolate, acuminate, coarsely and sharply serrate, coriaceous or submembranous, flat, 1-nerved, paler beneath. Racemes few or many towards the tips of the branches, solitary and axillary, slender, curved or erect, 3–9 in. long, many-flowered; pedicels slender, puberulous, $\frac{1}{3}$–1 in. long; bracts linear-subulate. Flowers $\frac{1}{3}$–$\frac{1}{2}$ in. diam., white or pale-rose. Calyx deeply 4-partite; segments ovate-lanceolate or oblong-ovate, acute or acuminate. Corolla with a very short tube and 4 rounded spreading lobes. Capsule broadly oblong, turgid, emarginate or almost 2-lobed, usually about $\frac{1}{3}$ longer than the calyx.—*A. Rich. Fl. Nouv. Zel.* (1832) 189; *A. Cunn. Precur.* (1838) n. 380; *Raoul Choix* (1846) 43; *Hook. f. Fl. Nov. Zel.* i (1853) 195; *Handb. N.Z. Fl.* (1864) 216; *Cheesem. Man. N.Z. Fl.* (1906) 542; *Adamson in Journ. Linn. Soc.* xl (1912) 266. V. irrigans *T. Kirk in Trans. N.Z. Inst.* ii (1870) 94.

Var. **lanceolata** *Hook. f. Fl. Nov. Zel.* i (1853) 195.—Stems shorter and more slender. Leaves $\frac{1}{2}$–$1\frac{1}{2}$ in. long, $\frac{1}{12}$–$\frac{1}{8}$ in. broad, linear or narrow linear-lanceolate.—*Handb. N.Z. Fl.* (1864) 216. V. lanceolata *Benth. in DC. Prodr.* x (1846) 462.

Var. **diffusa** *Hook. f. Handb. N.Z. Fl.* (1864) 216.—Procumbent, diffusely branched. Leaves $\frac{1}{2}$–$1\frac{1}{2}$ in. long, ovate or ovate-oblong, acute. Calyx-segments ovate, acute.—V. diffusa *Hook. f. Ic. Plant.* (1844) t. 645; *Fl. Nov. Zel.* i (1853) 195.

North and South Islands: From the Thames goldfields to the south of Otago, but often local. Most plentiful on the west coast of the South Island. Sea-level to 3000 ft. November–January.

An exceedingly variable plant. Forster's type, judging from the description given by A. Richard, is a rather small-leaved state, with lanceolate leaves 1–2 in. long; and according to Mr. N. E. Brown corresponds to the var. *minor* of the "Flora Novae-Zealandiae." But it passes insensibly into a much more luxuriant state, with leaves sometimes over 4 in. long, and with longer racemes. This again varies into var. *lanceolata*, Mr. Kirk's *V. irrigans* being about half-way between the two. Var. *diffusa* is also connected by numerous intermediates.

93. **V. Lyallii** (*Hook. f.*) *Fl. Nov. Zel.* i (1853) 196.—Stems slender, prostrate and rooting, much and diffusely branched, 3–18 in. long, more rarely suberect from a prostrate base; branches terete, usually bifariously pubescent, sometimes conspicuously so, rarely almost glabrous. Leaves shortly petioled, spreading, $\frac{1}{4}$–$\frac{1}{2}$ in. long, broadly ovate or almost orbicular to oblong-ovate, obtuse or subacute, with 2 or 3 coarse blunt serratures on each side, thick and coriaceous, glabrous, often reddish on the midrib beneath and on the petiole. Racemes several, few- or many-flowered, on slender erect peduncles 2–6 in. long usually springing from near the ends

of the branches but sometimes lateral, glabrous or more or less pubescent; pedicels slender, the lowest ½ in. long or more. Flowers ⅓ in. diam., white with pink veins. Calyx deeply 4-partite; segments ovate-oblong, acute, margins ciliolate. Corolla-tube very short; limb broad, spreading, with 4 rounded lobes. Stamens shorter than the corolla-lobes. Capsule broadly obovate-oblong, turgid, 2-lobed or emarginate, exceeding the calyx.—*Handb. N.Z. Fl.* (1864) 215; *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 349; *Cheesem. Man. N.Z. Fl.* (1906) 543; *Adamson in Journ. Linn. Soc.* xl (1912) 267.

T. 71 : 92.

Var. **suberecta** *Cheesem. Man. N.Z. Fl.* (1906) 543.—Stem woody at the base; branches slender, wiry, erect or suberect. Leaves usually narrower, oblong or obovate-oblong, with coarser and more numerous teeth, sometimes almost lobed.—V. Lyallii *var. β Hook. f. Fl. Nov. Zel.* i (1853) 196.

Var. **angustata** *Petrie in Trans. N.Z. Inst.* xlix (1917) 53.—Stems slender, erect, much branched from the base, densely pubescent. Leaves crowded, spreading, linear-obovate. South-west Nelson, near the mouth of the Ngakawau River, *Petrie!*

North Island: Ruahine and Tararua Mountains, apparently not common. South Island: Hilly or mountainous districts, abundant, especially on the west side of the Island. Sea-level to 4500 ft. November–March.

A very variable little plant, but on the whole recognized without much difficulty by the prostrate and diffusely branched mode of growth, small broad glabrous leaves, and slender many-flowered racemes of rather large flowers. *V. catarractae* is a much taller and more erect plant, with much longer and narrower leaves and larger flowers. *V. Bidwillii* differs in its smaller leaves and longer strict racemes. *V. Olseni* is smaller and stouter, with more of the habit of *V. Hookeriana*, and has more pubescent racemes and fewer flowers; while *V. Hookeriana* is separated by the stouter and more rigid habit, pubescent leaves, and much stouter glandular-pubescent raceme with fewer flowers. The *V. Lyallii* of the *Botanical Magazine* (t. 6456) seems to me to be quite different from the true *Lyallii* in the greater size, erect habit, larger ovate acute leaves, and larger flowers, and probably represents a distinct species intermediate between *V. Lyallii* and *V. catarractae*, but I have seen no specimens.

P. A.

94. **V. Bidwillii** (*Hook.*) *Ic. Plant.* (1848) t. 814.—Stems slender, prostrate and rooting, much branched, woody at the base, 3–12 in. long; branches creeping, often matted, glabrous or pubescent. Leaves rather distant, shortly petioled or almost sessile, minute, $\frac{1}{10}$–$\frac{1}{4}$ in. long, broadly oblong or obovate, obtuse, with 1 or 2 deep notches on each side or entire, thick and coriaceous, black when dry. Peduncles axillary, remote from the ends of the branches, very long, 3–9 in., slender, strict, erect, glabrous or puberulous, few- or many-flowered; pedicels slender, erect, $\frac{1}{4}$–$\frac{1}{2}$ in. long; bracts small, oblong or linear-oblong, obtuse. Flowers about ⅓ in. diam. Calyx 4-partite; segments ovate or oblong, obtuse. Corolla-tube very short; limb with 4 spreading rounded lobes. Stamens shorter than the corolla-lobes. Capsule broadly oblong, retuse, exceeding the calyx.—*Hook. f. Fl. Nov. Zel.* i (1853) 196; *Handb. N.Z. Fl.* (1864) 215; *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 349; *Cheesem. Man. N.Z. Fl.* (1906) 543; *Ill. N.Z. Fl.* ii (1914) t. 157.

T : 71 : 92.

South Island: Not uncommon in mountain districts as far south as Central Otago, usually on shingle-beds by the sides of streams, ascending to 4000 ft. November–February.

V. Bidwillii is a remarkably distinct species, and can always be distinguished by its habit of forming dense carpets, by its minute uniform leaves, which vary from $\frac{1}{5}$–$\frac{1}{10}$ in. in length, and have one or two teeth on each side, by its long erect peduncles, and rather large flowers. Probably *V. Lyallii* is its nearest ally, but the habit is very different, being much more diffuse and erect, the leaves are larger, and the peduncles are shorter.

P. H. Allan Trans 69 : 1939 : 276.

95. **V. Hookeriana** (*Walp.*) *Rep.* iii (1844–45) 341.—A small stout much or sparingly branched prostrate herb 3–10 in. long; branches short, stout, ascending, leafy, glandular-pubescent. Leaves crowded, very shortly petiolate, spreading, $\frac{1}{4}$–$\frac{1}{2}$ in. long, broadly ovate or oblong-ovate, obtuse, coarsely and obtusely crenate, thick and coriaceous, rigid, often black when dry, pubescent on both surfaces or glabrous above. Peduncles usually several, lateral or near the tips of the branches, 1–2 in. long, stout, erect, densely pubescent, bearing a 4–8-flowered corymbose raceme at the top; bracts, pedicels, and calyces densely glandular-pubescent. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. diam., variable in colour, from bluish-purple or violet-purple to white or white streaked with purple. Calyx 4-partite; segments ovate, obtuse. Corolla-tube very short; limb broad, spreading, 4-lobed; lobes rounded. Stamens rather shorter than the lobes. Capsule broadly oblong, about $\frac{1}{3}$ longer than the calyx when mature.—*Cheesem. Man. N.Z. Fl.* (1906) 544. V. nivea *Hook. f. Ic. Plant.* (1844) t. 640 (*not of Lindl.*). V. nivalis *Benth. in DC. Prodr.* x (1846) 477; *Hook. f. Fl. Nov. Zel.* i (1853) 196; *Handb. N.Z. Fl.* (1864) 215. V. compacta *Col. in Trans. N.Z. Inst.* xx (1888) 202.

North Island: Central volcanic plateau, abundant on Tongariro, Ngauruhoe, and Ruapehu, chiefly on shingle-slopes and rocky places, *Bidwill, H. Hill! T. Kirk! Spencer! T. F. C., Cockayne.* 3000–6000 ft.

The usual state of this plant is excellently figured in the "Icones Plantarum." Its distinguishing characters are the stout habit, rather large closely placed almost sessile rigid and coriaceous leaves, stout glandular-pubescent peduncles, and short corymbose racemes of rather large flowers.

P.

96. **V. Olseni** *Col. in Trans. N.Z. Inst.* xxviii (1896) 607.—Stems prostrate, sparingly branched; branches short, rooting at the nodes, densely pubescent with short spreading hairs. Leaves shortly petioled, rather close-set, spreading, $\frac{1}{4}$–$\frac{1}{2}$ in. long, broadly ovate or almost orbicular, obtuse, deeply and coarsely serrate, thick and coriaceous, glabrous, dark-green. Racemes many-flowered, on strict erect densely pubescent lateral peduncles 3–5 in. long; pedicels $\frac{1}{4}$–$\frac{1}{2}$ in. long, slender. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. diam., white with pink veins. Calyx deeply 4-partite; segments broadly ovate, obtuse, margins ciliolate. Corolla-tube very short, limb with 4 rounded spreading lobes. Stamens shorter than the corolla-lobes. Capsule broadly oblong, turgid, emarginate, $\frac{1}{3}$ as long again as the calyx.—*Cheesem. Man. N.Z. Fl.* (1906) 544.

North Island: Ruahine Mountains, *Colenso! Olsen, Petrie! A. Wall!* Usually on shingle-slopes or rocky ridges. 2500–5000 ft.

I retain this as a species for the present, although far from satisfied as to its distinctness from *V. Hookeriana*, from which it differs mainly in the more slender mode of growth, glabrous leaves, more slender and less pubescent many-flowered racemes, and in the narrower capsule. It is apparently intermediate between *V. Hookeriana* and *V. Lyallii*.

P.

97. **V. spathulata** *Benth. in DC. Prodr.* x (1846) 477.—A small prostrate excessively branched pubescent little plant, forming dense patches 3–9 in. across; branches short, stout, ascending, leafy, clothed with crisped white hairs. Leaves crowded, spreading, petiolate, $\frac{1}{6}$–$\frac{1}{2}$ in. long including the petiole, ovate-spathulate or deltoid-spathulate, obtuse, coarsely crenate or crenate-lobed, thick and coriaceous, black when dry, more or less hairy on both surfaces; petiole about as long as the blade, broad, channelled. Peduncles near the tips of the branches, short, stout, pubescent, equalling

P. trigida (Petrie 55: 437.) Oliver 1944

the leaves or nearly twice as long as them, 2–5-flowered; bracts foliaceous, and with the pedicels and calyces densely pubescent. Flowers ¼ in. diam., white. Calyx 4-partite; segments oblong or obovate-oblong, obtuse. Corolla-tube short; limb broad, 4-lobed, lobes rounded. Stamens 2, shorter than the corolla-lobes. Capsule equalling or slightly exceeding the calyx, broadly obcordate, pubescent.—*Hook. f. Fl. Nov. Zel.* i (1853) 197; *Handb. N.Z. Fl.* (1864) 216; *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 349; *Cheesem. Man. N.Z. Fl.* (1906) 545. V. vulcanica *Col. in Trans. N.Z. Inst.* xx (1888) 203. V. subrosulata *Col. l.c.* xxxi (1899) 278.

North Island: Central volcanic plateau, abundant on Tongariro, Ngauruhoe, and Ruapehu, chiefly on shingle-slopes, *Bidwill, Tryon! H. Hill! Spencer! T. F. C., Cockayne;* Ruahine Mountains, *H. Hill!* 4000–6500 ft.

This is a true shingle-plant, with long, often tortuous prostrate stems, putting up numerous short erect flowering branches, often densely compacted. The flowers are nearly always pure-white, but I have noticed plants bearing pale lavender-blue flowers. Its nearest ally is doubtless *V. Hookeriana;* but it is much more depressed and much more branched, the leaves are spathulate and on longer petioles, the peduncles are much shorter, and the capsules are broader and obcordate.

N.Z.S.

P. 98. **V. Birleyi** *N. E. Brown in Kew Bulletin* (1911) 345.—Stems sparingly branched, decumbent at the base, erect or flexuose above, somewhat fleshy, forming patches 6–8 in. across; branches few, glabrous or nearly so below, more or less puberulous or pilose above. Leaves crowded, or the lower somewhat remote, sessile or nearly so, thick and fleshy, more or less tinged with red, ¼–½ in. long, ⅕ in. broad, cuneate-obovate or broadly obovate, shortly 3–7-lobed, the central lobe the broadest, both surfaces covered with short whitish hairs; midrib obscure. Flowers few, in the uppermost axils of the leaves; peduncles short, 2-bracteolate; bracts linear-spathulate, obtuse. Calyx 4-partite; lobes ⅙ in. long, linear-oblong. Corolla large, white, ½–¾ in. diam.; lobes 5, subequal. Capsule ⅕ in. long, and about the same width, broadly obcordate, quite glabrous.—*Cheesem. in Trans. N.Z. Inst.* li (1919) 93. V. Grahami *Petrie in Trans. N.Z. Inst.* xlv (1913) 273.

South Island: Canterbury—Fissures on rocks near Copeland Pass, Mount Cook district, alt. 7000 ft., *P. Graham!* Otago—Rocks near the summit of Mount Bonpland, *Miss L. S. Gibbs! H. Birley!* Mount Tennyson, near Lake Wakatipu, *W. A. Thomson* and *J. Speden!* 5000–7000 ft. January–March. T. 75 : 194

A distinct and interesting species. Mr. N. E. Brown remarks that it is allied to *V. spathulata,* but differs in its stouter branches and subsessile leaves, finer and entirely different pubescence, and in the shorter peduncles.

Hebe ?

99. **V. plebeia** *R. Br. Prodr.* (1810) 435.—Stems slender, leafy, prostrate and rooting, much and diffusely branched, elongated, 1–3 ft. long, usually minutely pubescent. Leaves on rather long petioles; blade ½–1 in. long, broadly ovate or deltoid, obtuse or subacute, cordate or truncate at the base, coarsely and irregularly acutely toothed, 3-nerved, glabrous or sparsely hairy. Racemes lateral, axillary, pedunculate, 2–5 in. long, slender, loosely 5–10-flowered; pedicels spreading, ⅓–½ in. long; bracts linear-obovate. Flowers small, ⅙ in. diam. Calyx 4-partite; segments obovate-oblong, obtuse or subacute, enlarging in fruit. Corolla-tube very short; limb with 4 rounded lobes. Stamens shorter than the corolla-lobes. Capsule transversely oblong or orbicular, compressed, slightly emarginate, altogether included in the enlarged calyx.—*Benth. Fl. Austral.* iv (1869) 510;

Cheesem. Man. N.Z. Fl. (1906) 545. V. elongata *Benth. in DC. Prodr.* x (1846) 478; *Hook. f. Fl. Nov. Zel.* i (1853) 197; *Handb. N.Z. Fl.* (1864) 216. V. calycina *A. Cunn. Precur.* (1838) n. 382 (*not of R. Br.*).

North Island: In grassy places in lowland situations from the North Cape to the Thames River, once not uncommon, now rare and local.

100. **V. Anagallis** *Linn. Sp. Plant.* (1753) 12.—Stems stout, succulent, glabrous, decumbent at the base, then erect, simple or sparingly branched, 6–18 in. high. Leaves sessile and semiamplexicaul, 1–3 in. long, oblong-lanceolate or linear-oblong, subacute or obtuse, often cordate at the base, more or less serrate or almost entire, membranous when dry. Racemes numerous towards the ends of the branches, axillary, suberect, 4–10 in. long, many-flowered; bracts small, linear or lanceolate. Flowers small, $\frac{1}{5}$–$\frac{1}{4}$ in. diam., pale-blue or almost white. Calyx 4-partite; segments ovate-oblong, obtuse or subacute. Corolla-tube very short; limb 4-lobed, spreading. Capsule broadly oblong, notched, shorter than the calyx.—*Hook. f. Fl. Nov. Zel.* i (1853) 197; *Handb. N.Z. Fl.* (1864) 216.

North Island: Hawke's Bay, watery places, *Colenso!*

This has not been observed since its original discovery by Mr. Colenso, more than seventy years ago. Although a widely distributed plant in the Northern Hemisphere it is unknown in the Southern, except in South Africa, where it is supposed to be an introduction, and in New Zealand. Possibly Mr. Colenso's specimens were introduced as well; but, if so, it is remarkable that the plant should have apparently disappeared.

101. **V. Muelleri** *Buch. in Trans. N.Z. Inst.* xiv (1882) 351, t. 32.—Stems prostrate or rooting, branched, 6–18 in. long, putting up numerous short suberect branchlets $\frac{1}{2}$–2 in. long. Leaves crowded towards the tips of the branchlets, spreading, petioled, $\frac{1}{5}$–$\frac{1}{3}$ in. long, linear-obovate to ovate-oblong, obtuse, entire or with 1 or 2 coarse notches on each side, coriaceous, glabrous or the petioles ciliate on the margins. Flowers solitary and axillary at the tips of the branches, almost hidden by the leaves, sessile or shortly pedicelled, $\frac{1}{3}$ in. diam. Calyx 4-partite; segments linear-obovate, obtuse. Corolla-tube rather long, exceeding the calyx; limb spreading, 4-lobed. Stamens shorter than the corolla-lobes. Capsule equalling the calyx or rather shorter than it, transversely oblong, didymous.—*Cheesem. Man. N.Z. Fl.* (1906) 546.

South Island: Otago — Hector's Col, Mount Aspiring Range, alt. 5000 ft., *Buchanan* and *McKay!* Garvie Mountains, *Poppelwell.*

Of this I have only seen two very indifferent specimens in Mr. Buchanan's herbarium both long past flower. It is clearly a very distinct species, and, if Mr. Buchanan's plate is correct, differs widely from all the New Zealand species belonging to the section with didymous capsules in the elongated tube of the corolla.

102. **V. Cheesemanii** *Benth. in Hook. Ic. Plant.* (1882) t. 1366A.—Small, greyish-green, densely tufted, forming rounded cushions 2–5 in. diam., pubescent in all its parts; branches slender, closely compacted. Leaves spreading, $\frac{1}{8}$–$\frac{1}{2}$ in. long, narrow-obovate, obtuse, coarsely and obtusely toothed or lobed, puberulous on both surfaces, narrowed into a long or short broad petiole. Flowers solitary and axillary, subsessile, small, white, $\frac{1}{8}$ in. diam. Calyx deeply 4-partite, segments linear-spathulate, spreading, coarsely toothed towards the tip. Corolla slightly longer than the calyx; tube very short; limb with 4 obovate emarginate lobes. Stamens shorter than the corolla-lobes. Ovary broadly ovoid, hispid.

v. plano-petiolata S+T. 72:31. Mt. Mt. Pherson
v. laxa S+T. 72. 32. Homer valley.
also Trans. 73:166.

Capsule shorter than the calyx, broadly didymous, slightly compressed, hispid, 4-valved to the base.—*Cheesem. in Trans. N.Z. Inst.* xv (1883) 299; *Man. N.Z. Fl.* (1906) 547.

South Island: Nelson—Summit of Gordon's Knob and the Raglan Mountains, *T. F. C.*; Mount Richmond, Mount Starveall, Ben Nevis, and on most of the higher mountains of eastern Nelson, *F. G. Gibbs!* Canterbury—Shingle-slopes near the source of the Otira River, *T. F. C., Cockayne!* 3500–5500 ft.

A peculiar little plant, with much of the aspect of a small *Euphrasia.*

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South Island: Canterbury—Lake Forsyth, *T. Kirk!* Lake Ellesmere, *J. B. Armstrong*; Lake Lyndon, *J. D. Enys! T. Kirk! T. F. C.*; Mackenzie Plains, Lakes Tekapo and Pukaki, *T. F. C.* Otago—Near Oamaru, *Buchanan!* Central Otago, plentiful, *Petrie!* Wycliffe Bay, near Dunedin, *B. C. Aston!* Sea-level to 3000 ft. December–March.

Usually found on the dried-up margins of lakes and pools. It is probably not uncommon in suitable localities on the eastern side of the South Island, but is easily overlooked, except when in flower.

8. **OURISIA** Comm. 1789

Perennial herbs, erect or decumbent or more or less prostrate. Leaves opposite, mostly radical, entire or more usually crenate. Flowers axillary and solitary, or racemose or subumbelled on a scapiform peduncle. Calyx 5-lobed or 5-partite. Corolla more or less oblique or curved; tube long or short; lobes 5, spreading, imbricate in the bud, one of the lateral ones on the outside. Stamens 4, didynamous, included; filaments short; anthers reniform, the cells diverging at the base, confluent at the tip. Ovary 2-celled; style filiform; stigma capitate; ovules numerous in each cell. Capsule 2 celled, turgid or subcompressed, grooved on each side, loculicidally 2-valved, the placentas attached to the middle of the valves. Seeds numerous; testa loose, reticulate.

A handsome genus of about 25 species, confined to Andine South America, New Zealand, and Tasmania. All the New Zealand species are endemic.

A. Erect or decumbent at the very base. Leaves all radical. (Stems often creeping in O. sessilifolia.)

Stout, glabrous or nearly so, 9–24 in. high. Leaves coriaceous, long-petioled. Upper bracts whorled. Flowers ¾–1 in. diam... 1. *O. macrocarpa.*
More slender, pubescent or pilose, 6–24 in. high. Leaves submembranous, long-petioled. Upper bracts whorled. Flowers ½–¾ in. diam. .. .. 2. *O. macrophylla.*

O. macphersoni Cheesem. Trans. N.Z. T. 56:30.

Cheesem. Man. N.Z. Fl. (1906) 545. V. elongata *Benth. in DC. Prodr.* x (1846) 478; *Hook. f. Fl. Nov. Zel.* i (1853) 197; *Handb. N.Z. Fl.* (1864) 216. V. calycina *A. Cunn. Precur.* (1838) n. 382 (*not of R. Br.*).

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Veronica anagallis - aquatica, Linn.

not native to N.Z. see T.N.Z.I.

vol. 57, p. 68. (Ckn. & Allan).

also " 65 & (1935)

This has not been observed since its original discovery by Mr. Colenso, more than seventy years ago. Although a widely distributed plant in the Northern Hemisphere it is unknown in the Southern, except in South Africa, where it is supposed to be an introduction, and in New Zealand. Possibly Mr. Colenso's specimens were introduced as well; but, if so, it is remarkable that the plant should have apparently disappeared.

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103. **V. canescens** *T. Kirk in Trans. N.Z. Inst.* ix (1877) 503, t. 19.—A small creeping and rooting herb with intricately branched stems 1–4 in. long, often forming broad matted patches, everywhere hispid with greyish-white hairs. Leaves minute, spreading, shortly petioled or subsessile, $\frac{1}{12}$–$\frac{1}{10}$ in. long, obtuse, entire, more or less densely clothed on both surfaces with curved hispid hairs. Flowers solitary and axillary, large for the size of the plant, $\frac{1}{4}$–$\frac{1}{3}$ in. diam., pale-blue ; peduncles short, slender, $\frac{1}{4}$ in. long, with 2 hispid bracts below the middle. Calyx 4–5-partite ; segments linear-oblong, hispid. Corolla-tube very short ; limb spreading, 4-lobed ; lobes unequal, oblong, often emarginate. Capsule small, broadly oblong, slightly compressed, retuse, altogether included in the calyx.—*Trans. N.Z. Inst.* xxviii (1896) 516 ; *Cheesem. Man. N.Z. Fl.* (1906) 547.

South Island : Canterbury—Lake Forsyth, *T. Kirk !* Lake Ellesmere, *J. B. Armstrong ;* Lake Lyndon, *J. D. Enys ! T. Kirk ! T. F. C.* ; Mackenzie Plains, Lakes Tekapo and Pukaki, *T. F. C.* Otago—Near Oamaru, *Buchanan !* Central Otago, plentiful, *Petrie !* Wycliffe Bay, near Dunedin, *B. C. Aston !* Sea-level to 3000 ft. December–March.

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A. Erect or decumbent at the very base. Leaves all radical. (Stems often creeping in O. sessilifolia.)

Stout, glabrous or nearly so, 9–24 in. high. Leaves coriaceous, long-petioled. Upper bracts whorled. Flowers $\frac{3}{4}$–1 in. diam... 1. *O. macrocarpa.*
More slender, pubescent or pilose, 6–24 in. high. Leaves submembranous, long-petioled. Upper bracts whorled. Flowers $\frac{1}{2}$–$\frac{3}{4}$ in. diam. .. .. 2. *O. macrophylla.*

O. macphersoni Cheesem. Trans. T. 56:30.

Small, slender, delicate, 6–10 in. high. Leaves very thin and membranous, hardly reticulate .. .. 3. *O. Crosbyi.*
Small, stoutish, pubescent, 2–9 in. high. Leaves subcoriaceous, evidently reticulated. Upper bracts in pairs, rarely in threes. Flowers $\frac{1}{2}$–$\frac{2}{3}$ in. diam. .. .. 4. *O. Colensoi.*
Stout, most densely glandular-hairy, 2–6 in. high. Leaves obovate, narrowed into short broad petioles. Bracts in pairs. Flowers $\frac{3}{4}$ in. diam. .. .. 5. *O. sessilifolia.*

B. Creeping, often matted or caespitose. Leaves close-set along the creeping stem, usually distichous.

Glabrous or nearly so. Leaves $\frac{3}{4}$–$1\frac{1}{4}$ in., ovate-spathulate, thickly coriaceous, crenate. Flowers $\frac{3}{4}$–1 in. diam. .. .. .. 6. *O. Cockayniana.*
Glabrous or nearly so. Leaves $\frac{1}{8}$–$\frac{1}{3}$ in., obovate-spathulate, thickly coriaceous, entire or with 2–3 deep notches .. .. .. 7. *O. caespitosa.*
Small, petioles villous. Leaves round, cordate at the base. Flowers solitary, minute .. .. 8. *O. modesta.*
Leaves $\frac{1}{3}$–$\frac{2}{3}$ in., upper surface densely glandular-pubescent. Peduncles and bracts sparingly pubescent .. .. .. 9. *O. prorepens.*
Leaves $\frac{1}{4}$–$\frac{3}{4}$ in., margins ciliate with long jointed hairs. Peduncles and bracts thickly glandular-pubescent .. .. .. 10. *O. glandulosa.*

1. **O. macrocarpa** *Hook. f. Fl. Nov. Zel.* i (1853) 198.—Stems stout, erect from a short thick creeping rhizome, 9–24 in. high, purplish below, glabrous or with faint hairy lines decurrent from the bases of the bracts. Radical leaves numerous, on stout petioles 2–8 in. long; blade 1–5 in., broadly oblong or orbicular, cordate or subcordate at the base, crenate, dark-green above, paler beneath, very thick and coriaceous, quite glabrous except the margins towards the base, which are ciliate. Flowering stem stout. Cauline leaves 1 or 2 pairs, ovate or oblong, almost connate at the base, sessile. Inflorescence of 4–8 superposed whorls of pedicelled flowers. Bracts 3–6 in a whorl, oblong or oblong-lanceolate, coriaceous, crenate. Flowers large, $\frac{3}{4}$–1 in. diam., white; pedicels 1–3 in. long. Calyx deeply 5-partite; segments $\frac{1}{3}$ in. long, linear-oblong, obtuse, coriaceous, glabrous or the margins alone ciliate. Corolla-tube short and broad, villous within; lobes obovate, retuse. Capsule $\frac{1}{3}$–$\frac{1}{2}$ in. long, ovoid-oblong.—*Handb. N.Z. Fl.* (1864) 218; *Cheesem. Man. N.Z. Fl.* (1906) 548. O. macrocarpa *var.* cordata *Cockayne in Trans. N.Z. Inst.* xlviii (1916) 198. Trans 50 :189

Var. **calycina** *Cockayne in Trans. N.Z. Inst.* xlviii (1916) 198.—Leaves ovate or ovate-oblong, with a more or less cuneate base, never orbicular with a cordate base. Petiole hardly as long as the blade. Crenatures of the leaf smaller. Bracts larger, and peduncles stouter.—O. calycina *Col. in Trans. N.Z. Inst.* xxi (1889) 97.

South Island: The typical state not uncommon in the sounds of the south-west coast of Otago, *Lyall, Hector* and *Buchanan!* and others; Clinton Saddle, *Cockayne! F. G. Gibbs!* Var. *calycina:* Abundant on the central chain of the Southern Alps, from Arthur's Pass southwards to the Franz Josef Glacier. Sea-level to 3500 ft. November–January.

The finest species of the genus. It is allied to the following, but is easily separated by the much stouter and more coriaceous habit, by being nearly glabrous, and by the larger flowers and capsules.

Dr. Cockayne's discovery that the south-western form of the species differs from that found in the central portion of the Southern Alps is most interesting, and shows what a small advance has been made in our knowledge of the flora of the Otago sounds during the last 60 years.

2. **O. macrophylla** *Hook. Ic. Plant.* (1843) tt. 545, 546.—Erect from a short stout decumbent rhizome, 6–24 in. high, more or less pubescent or pilose with soft spreading hairs, rarely almost glabrous. Radical leaves variable

O. macphersoni C+A. Trans 56:1926:30.

in size and shape, on long petioles; petioles 1–6 in. long, stout or slender, sheathing at the base; blade 1–5 in., ovate or ovate-oblong to orbicular-oblong, obtuse, oblique and cordate or cuneate at the base, crenate, rather thin and membranous, sparsely pubescent or almost glabrous. Flowering stem erect, rather stout or slender. Cauline leaves 1 or rarely 2 pairs, ovate, sessile. Inflorescence of 3–7 superposed whorls of pedicellate flowers, in small varieties sometimes reduced to a few-flowered terminal umbel. Bracts 3–8 in a whorl, linear-oblong or linear-obovate to linear, crenate. Flowers large, $\frac{1}{2}$–$\frac{3}{4}$ in. diam., white or white with purplish streaks; pedicels $\frac{1}{2}$–2 in. long, slender, erect. Calyx deeply 5-partite; segments $\frac{1}{4}$ in. long, lanceolate or linear, glandular-hairy. Corolla-tube slightly curved, villous within; lobes obovate, retuse. Capsule $\frac{1}{4}$ in. long, ovoid-oblong, turgid, membranous.—*Hook. f. Fl. Nov. Zel.* i (1853) 197; *Handb. N.Z. Fl.* (1864) 218; *Cheesem. Man. N.Z. Fl.* (1906) 549. O. robusta *Col. in Trans. N.Z. Inst.* xvii (1886) 246.

North and South Islands: Not uncommon in damp mountainous localities from Moehau (Cape Colville), Mount Hikurangi, and Mount Egmont southwards to Banks Peninsula and north Otago, and plentiful throughout north-west Nelson and Westland. Sea-level to 4500 ft. November–January.

In its fully developed state this is an exceedingly handsome plant. It is perhaps nowhere more abundant than on Mount Egmont, where it was originally discovered by Dieffenbach.

3. **O. Crosbyi** *Cockayne in Trans. N.Z. Inst.* xlvii (1915) 113.—A slender more or less pubescent herb 6–10 in. high or more; rhizome long, creeping, but becoming erect towards the top, internodes $\frac{1}{2}$–$\frac{3}{4}$ in. long. Radical leaves more or less clothed with short white hairs, long-petioled; petioles 1–2 in. long, very slender; blade $\frac{3}{4}$–$1\frac{1}{4}$ in. long, oblong or oblong-ovate, obtuse or subacute, obtusely serrate, very thin and membranous, venation reticulated, but not distinctly so. Flowering stem very slender; bracts in opposite pairs, similar to the leaves but much smaller, sessile or nearly so. Flowers 3–5, about $\frac{1}{3}$ in. diam.; pedicels $\frac{1}{4}$–$\frac{1}{2}$ in. long, slender. Calyx deeply 5-partite; lobes linear, exceeding the corolla-tube. Corolla white with a yellow throat; tube short. Ripe capsule not seen.

South Island: Nelson—Hope Valley, *H. J. Matthews!* Otago—Dusky Sound, *R. M. Laing!* Southland—Lake Hauroko, *J. Crosby Smith!* Longwood Range, *Cockayne!* Stewart Island: Paterson's Inlet, *Petrie!* forest near Mount Anglem, *Cockayne.* Sea-level to 3000 ft. December–January.

I am not at all satisfied that this is anything more than a small shade form of *O. macrophylla,* of which I have several varieties closely approaching it.

4. **O. Colensoi** *Hook. f. Handb. N.Z. Fl.* (1864) 218.—Rhizome slender, creeping; stems erect, 2–9 in. high, pilose with soft spreading hairs. Leaves all radical, on slender petioles $\frac{1}{2}$–1 in. long; blade about the same length, oblong or ovate-oblong, obtuse, subcordate or cuneate at the base, crenate, rather membranous, sparsely glandular-hairy on both surfaces or almost glabrous; venation distinct on the under-surface. Flowering stem or scape 1–8-flowered; bracts in pairs or rarely in threes, linear-oblong, crenate. Flowers $\frac{1}{2}$ in. diam., white; pedicels $\frac{1}{4}$–1 in. long. Calyx 5-partite; segments linear, glandular-pubescent. Corolla-tube short, curved; lobes obovate, retuse. Capsule broadly oblong, turgid.—*Cheesem. Man. N.Z. Fl.* (1906) 549.

North Island: Slopes of Tongariro and Ruapehu, *T. F. C., Cockayne, W. Townson! Spencer!* Ruahine Mountains, *Colenso, Tryon! B. C. Aston! Petrie!* Kaimanawa Mountains, *B. C. Aston!* Tararua Mountains, *Petrie!* 2500–5000 ft. December–January.

I am now convinced that this species should be limited to the plant originally discovered by Colenso near the base of Ruapehu and on the Ruahine Mountains. The South Island specimens attributed to it differ in many respects, and are best referred to small states of *D. macrophylla* or to *O. Crosbyi*.

5. **O. sessilifolia** *Hook. f. Handb. N.Z. Fl.* (1864) 218.—Rhizome stout or slender, creeping and rooting, branched, glandular-hairy above. Leaves all radical, spreading and appressed to the surface of the ground, 1–2 in. long, broadly ovate- or obovate-spathulate, obtuse, suddenly narrowed into broad short petioles, crenate, scarcely coriaceous, pale-green, upper surface and margins densely villous with glandular hairs, under-surface not so thickly clothed but rarely glabrate. Peduncle stout, 2–6 in. high, 2–8-flowered, most densely villous, as are the bracts, pedicels, and calyces. Bracts obovate or oblong, crenate; pedicels short, stout. Flowers large, $\frac{3}{4}$ in. diam., white shading into purple at the base. Calyx $\frac{1}{3}$ in. long, 5-partite; segments linear-oblong, obtuse. Corolla-tube broad; lobes large, rounded, retuse at the tip. Capsule ovate-oblong, not seen quite ripe.—*Cheesem. Man. N.Z. Fl.* (1906) 550; *Ill. N.Z. Fl.* ii (1914) t. 158.

T. 71: 92.

South Island: Marlborough—Kaikoura Mountains, *Buchanan!* Nelson—Mount Buckland, *W. Townson!* Canterbury, Westland, and Otago—Not uncommon on the higher mountains of the dividing-range, and particularly abundant in the Mount Cook district, and extending to the Takitimu Mountains. Stewart Island: Upper slopes of Mount Anglem, *T. Kirk! Cockayne.* 3500–6500 ft. December–February.

A handsome plant. Its habit is peculiar, the lower portion of the stem being creeping and rooting, the leaves being practically bifarious and closely appressed to the surface of the ground. The stout peduncle is often 6 in. high, and bears numerous large white flowers, which shade into dark-violet towards the base. When in full flower it is thus a charming and attractive plant.

6. **O. Cockayniana** *Petrie in Trans. N.Z. Inst.* xxix (1897) 426.—Forming large matted patches. Stems 3–6 in. long or more, branched, rather stout, creeping and rooting, glabrous or nearly so. Leaves in close-set opposite pairs, spreading and recurved, $\frac{3}{4}$–$1\frac{1}{4}$ in. long, ovate or ovate-spathulate, obtuse, suddenly narrowed into rather long sheathing petioles, crenate, bright-green above, often purplish below, coriaceous, glabrous or the margins of the petioles ciliate. Peduncles stout, erect, purplish, 3–6 in. high, 3–6-flowered, glabrous or nearly so. Bracts rather large, narrow obovate-spathulate, crenate, margins sometimes ciliate towards the base; pedicels slender, 1–$1\frac{1}{2}$ in. long. Flowers large, $\frac{3}{4}$–1 in. diam., white. Calyx $\frac{1}{3}$ in. long, 5-partite; segments oblong, obtuse. Corolla-tube broad, rather longer than the calyx; lobes broadly oblong, retuse. Ripe capsules not seen.—*Cheesem. Man. N.Z. Fl.* (1906) 550.

South Island: Canterbury—Arthur's Pass, *Cockayne, T. F. C.*; Lake Minchin, Snowcap Range, Upper Poulter Valley, *Cockayne!* Westland—Source of the Otira, Kelly's Hill, Mount Alexander, *Cockayne!* Otago—Cosmos Peaks, Lake Wakatipu, *H. J. Matthews!* Routeburn, *Poppelwell.* 3000–4500 ft. December–January.

Allied to *O. caespitosa*, but well distinguished by the larger size, much larger ovate-spathulate long-petioled leaves, and larger flowers.

7. **O. caespitosa** *Hook. f. Fl. Nov. Zel.* i (1853) 198.—Forming broad matted patches. Stems often much branched, 2–6 in. long or more, creeping and rooting, stout or rather slender, leafy, glabrous or sparingly pilose or tomentose; branches short, ascending. Leaves close-set, spreading and recurved, usually distichous, $\frac{1}{6}$–$\frac{1}{3}$ in. long, obovate-spathulate, obtuse, narrowed into a short broad sheathing petiole or almost sessile, coriaceous

Sonderabdruck aus Fedde, Repertorium VII (1909), p. 114.

Ourisia modesta Diels, eine neue Art Neuseelands.

Herba minuta. Caulis procumbus repens radicans. Foliorum petiolus hinc inde villosulus vel ciliatus, 2—4 mm longus; lamina crassiuscula glabra, e basi leviter cordata reniformis vel rotundato-elliptica, 3—5 mm longa, 2,5—4,5 mm lata; flores solitarii; pedunculus 5 mm longus; calyx 4- (rarius 5-) lobus, tubus circ. 5 mm longus, lobi 1,5 mm longi, lati, obtusi; corolla 5-fida, tubus 4 mm longus, 2,5 mm latus, lobi anguste elliptici apice truncati vel levissime emarginati 3,5 mm longi, 1,5 mm lati; staminum antherae reniformes, loculi demum confluentes; ovarium glabrum ovoideum 1,5 mm longum, stylus 2,5 mm longus; stigma capitato-discoideum.

Neu-Seeland: Stewart Island, Rakiahua Valley, auf nassem Boden (Dr. L. Cockayne!).

Species minuta *Ourisiae caespitosae* Hook. f. atque eius varietati *gracilis* Hook. f. proxima videtur, sed petiolis longioribus et floribus multo minoribus facile distinguitur.

With L. C's regards

10 Feb 1910.

or almost fleshy, bright-green, glabrous or the margins of the petioles ciliate, entire or more usually with 1–3 deep notches or crenatures. Peduncles strict, erect, 1–3 in. long, 1–5-flowered, glabrous, as are the bracts, pedicels, and calyces. Bracts 1 or 2 pairs, similar to the leaves; pedicels slender. Flowers $\frac{1}{2}$–$\frac{2}{3}$ in. diam., white. Calyx $\frac{1}{4}$ in. long, 5-partite; segments oblong or linear-oblong, obtuse, often dilated at the tip. Corolla-tube broad, rather longer than the calyx; lobes broad, rounded. Capsule $\frac{1}{5}$ in. long, ovate-oblong.—*Handb. N.Z. Fl.* (1864) 219; *Cheesem. Man. N.Z. Fl.* (1906) 551. T. 71:92 & 72:327.

Var. **gracilis** *Hook. f. l.c.* (1867) 738.—Much more slender. Leaves smaller, $\frac{1}{10}$–$\frac{1}{6}$ in. long. Peduncles slender, 1–2-flowered; bracts small. Flowers smaller, $\frac{1}{3}$–$\frac{1}{2}$ in. diam. Calyx-segments linear-oblong.

North Island: Summit of Mount Hikurangi, *Adams* and *Petrie!* Ruahine Mountains, *Colenso!* Tongariro, *Cockayne;* Kaimanawa Mountains, *B. C. Aston!* Tararua Mountains, *T. P. Arnold! W. Townson!* Mount Hector, *Petrie.* South Island: Not uncommon in mountainous localities from Nelson to Foveaux Strait. Stewart Island: Upper slopes of Mount Anglem, *T. Kirk.* Var. *gracilis:* High lands of Canterbury and Otago, *Haast, Buchanan, Cockayne!* 3000–6500 ft. December–February.

A pretty little plant, easily recognized by the matted habit, small bright-green almost glabrous leaves, and glabrous peduncle, bracts, and calyces.

8. **O. modesta** *Diels in Fedde Repertorium,* vii (1909) 114.—Forming small pale-green matted patches 2–4 in. diam. Stems creeping and rooting at the nodes, wiry, much branched. Leaves minute; petiole $\frac{1}{16}$–$\frac{1}{8}$ in. long, more or less villous or ciliate; blade $\frac{1}{5}$–$\frac{1}{8}$ in., elliptic-rounded, cordate or reniform at the base, quite entire or emarginate, somewhat thick and fleshy, margins sometimes faintly ciliate. Flowers solitary; peduncles $\frac{1}{4}$ in. long. Calyx 4-lobed or rarely 5-lobed; tube $\frac{1}{4}$ in. long; lobes narrow-elliptic, truncate or emarginate at the apex. Corolla 5-lobed; tube $\frac{1}{8}$ in. long, $\frac{1}{10}$ in. diam.; lobes more or less rounded. Anthers reniform, cells at length confluent. Ovary glabrous, ovoid; stigma capitate-discoid.—*Cockayne Rep. Bot. Stewart Is.* (1909) 44.

Stewart Island: Wet ground in the Rakiahua Valley, *Cockayne.* December–January. Hord Dist. Trans 58: 1926: 72.

I have not seen specimens of this. Dr. Diels states that it is closely allied to *O. caespitosa* var. *gracilis,* but is readily distinguished by the longer petioles and much smaller flowers.

9. **O. prorepens** *Petrie in Trans. N.Z. Inst.* xxv (1893) 272.—Stems rather slender, branched, creeping and rooting, 2–4 in. long, glandular-hairy. Leaves close-set, spreading, distichous, $\frac{1}{3}$–$\frac{2}{3}$ in. long, obovate, rounded at the tip, narrowed into a broad thin petiole at the base, crenate, densely glandular-pilose above, almost glabrate with the veins conspicuous beneath. Peduncles erect, 2–4 in. high, sparingly glandular-pubescent, 3–6-flowered. Bracts 1 or 2 pairs, similar to the leaves, nearly glabrous; pedicels slender. Flowers large, $\frac{3}{4}$ in. diam., white. Calyx about $\frac{1}{4}$ in. long, 5-partite; segments oblong, obtuse, sparingly glandular-pubescent. Corolla-tube longer than the calyx; lobes broad, rounded. Ripe capsules not seen.—*Cheesem. Man. N.Z. Fl.* (1906) 551.

South Island: Otago—Mount Bonpland, *Petrie!* Mount Kyeburn and Mackinnon's Pass, *H. J. Matthews!* Routeburn, *Poppelwell.* Stewart Island: Upper slopes of Mount Anglem, *Cockayne.* 4000–5000 ft.

A puzzling plant, agreeing in some of its characters with *O. sessilifolia, O. glandulosa,* and *O. caespitosa,* but which cannot be satisfactorily placed with any of the three

10. **O. glandulosa** *Hook. f. Handb. N.Z. Fl.* (1864) 219.—Forming broad patches. Stems stout, branched, creeping and rooting, glabrous or nearly so, 2–6 in. long. Leaves close-set, imbricating, usually distichous, spreading or recurved, ¼–¾ in. long, obovate-spathulate, rounded at the tip, gradually narrowed into a short broad petiole or sessile, entire or obscurely crenate, thick and coriaceous, margins densely ciliate with long jointed hairs, upper surface glandular-pilose towards the tip, under-surface glabrous, veined. Peduncles stout, erect, 1–3 in. long, 1–6-flowered, thickly covered with spreading glandular hairs, as are the bracts, pedicels, and calyces. Bracts 1–3 pairs, similar to the leaves; pedicels slender. Flowers ½–¾ in. diam., white. Calyx ¼–⅓ in. long, 5-partite; segments oblong, obtuse. Corolla-tube short and broad; lobes obovate, rounded at the tip. Capsule nearly ⅓ in. long, ovoid, acute, equalling the calyx-segments.—*Cheesem. Man. N.Z. Fl.* (1906) 552.

South Island: Otago—Mount Alta, *Buchanan!* Kurow Mountains, Dunstan Mountains, Mount Cardrona, Mount St. Bathan's, *Petrie!* Ben Lomond, *Willcox;* Haast River to Makarora, Eyre Mountains, *Poppelwell.* 3500–6000 ft. November–January. Mt Cook Natl Rec. R.M. 4: 1935: 112

Paparoa Mts: Mt Mandelis Trans 57: 1926: 72.

A well-marked species, easily recognized by the long jointed hairs on the leaf-margins, and by the thick glandular pubescence on the peduncles and bracts.

9. **EUPHRASIA** Linn. 1735

Annual or perennial herbs, more or less parasitic. Leaves opposite, toothed or laciniate or palmately 3–5-fid, on the flowering branches often insensibly passing into leafy bracts. Flowers in terminal spikes or racemes, or few towards the tips of the branches. Calyx tubular or campanulate, 4-lobed; lobes equal or connate in pairs. Corolla-tube narrow below, dilated above; limb 2-lipped; upper lip erect, concave, 2-lobed; lower lip 3-lobed. Stamens 4, didynamous, converging beneath the upper lip; anther-cells distinct, parallel, equally or unequally mucronate at the base. Style pilose; stigma capitate. Capsule oblong or oblong-orbicular, compressed, loculicidally dehiscent. Seeds usually numerous, pendulous, oblong, longitudinally grooved.

A genus found in the temperate regions of both hemispheres. The species are extremely variable and difficult to characterize, and are variously estimated at from 75 to 100, according to the different views of authors. I have to express my indebtedness to Dr. R. von Wettstein's elaborate monograph for much information respecting the New Zealand forms, all of which are endemic.

* Ovary with several ovules in each cell.

Perennial, erect, 6–30 in. high, much branched. Leaves narrowed into a distinct petiole, margins flat. Flowers numerous, large, ½–¾ in. long	1. *E. cuneata.*
Perennial, usually erect, 3–8 in. high, sparingly branched. Leaves close-set, not narrowed into a distinct petiole, margins recurved. Flowers large, ½–¾ in. long	2. *E. Monroi.*
Perennial, usually erect, 3–8 in. high. Leaves in distant pairs, erect, cuneate, narrowed to the base. Flowers large, ½–⅔ in. long	3. *E. Laingii.*
Subperennial, much branched from the base. Leaves in distant pairs, narrow ovoid-rhomboid, ⅙–¼ in. Flowers large, ⅓–½ in., bright-yellow. Peduncles long and slender	4. *E. Townsoni.*
Annual, or the rootstock alone perennial, erect or decumbent, slender, 1–4 in. high. Leaves distant, sessile, margins recurved. Flowers large, ½–¾ in. long	5. *E. revoluta.*

Slender, diffusely branched. Leaves from ovate-orbicular to ovate-oblong, 3–4-lobed on either side with a terminal one. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. .. .. 6. *E. australis.*

Annual, erect, sparingly branched, 1–4 in. high. Leaves remote, ovate, toothed. Flowers $\frac{1}{3}$–$\frac{1}{2}$ in. long, yellow .. 7. *E. Cockayniana.*

Annual, erect or decumbent, much or sparingly branched, 1–4 in. high. Leaves remote, ovate, toothed. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. long, white .. .. 8. *E. zealandica.*

Minute, stems matted, 2–3 in. long. Leaves $\frac{1}{8}$–$\frac{1}{6}$ in., linear-lanceolate, quite entire. Flowers $\frac{1}{6}$ in. .. .. 9. *E. integrifolia.*

** Ovary with only 2 ovules in each cell. .. ..

Annual, slender, much branched from the base, 1–3 in. high. Leaves with 2–4 obtuse teeth. Flowers $\frac{1}{3}$–$\frac{1}{2}$ in. long; peduncles long, slender .. .. 10. *E. Cheesemanii.*

Annual, branched from the base, $\frac{1}{2}$–$1\frac{1}{2}$ in. high; branches weak, not rooting. Leaves deeply 5-lobed. Flowers $\frac{1}{4}$ in. long, almost sessile, tube of corolla short .. .. 11. *E. Dyeri.*

Annual, creeping and rooting. Leaves in distant pairs, small, $\frac{1}{10}$–$\frac{1}{8}$ in., oblong-cuneate, deeply 3–7-lobed. Flowers $\frac{1}{3}$ in. long .. .. 12. *E. umbellata.*

Annual, very slender, creeping and rooting. Leaves remote, minute, $\frac{1}{12}$–$\frac{1}{10}$ in., deeply 3-lobed. Flowers axillary, pedunculed, $\frac{1}{3}$ in. .. .. 13. *E. repens.*

Euphrasia Crosbyi-Smithii Petrie in Trans. N.Z. Inst. xlviii (1916) 190 and *E. diversifolia* Petrie *l.c.* xlix (1917) 54 appear to me to be described without sufficient indication of their position and relationships, and are best held over for further information.

1. **E. cuneata** *Forst. f. Prodr.* (1786) 43. — Perennial, 6–30 in. high or even more; stems erect or decumbent, firm, sometimes almost woody at the base, usually much branched and often excessively so, rarely simple; branches slender, virgate, leafy, puberulous or rarely almost glabrous. Leaves variable in size and shape, $\frac{1}{5}$–$\frac{2}{3}$ in. long, broad or narrow obovate-cuneate, rounded at the tip, narrowed at the base into a distinct petiole of variable length, coriaceous, glabrous, with 1–3 more or less distinct notches on each side, rarely entire; margins flat, not recurved. Flowers usually very numerous, in large specimens from the repeated branching of the flowering stems and the reduction of the upper leaves to bracts forming a quasi-paniculate inflorescence, in smaller forms spicate; peduncles shorter than the calyx. Calyx small, narrow, 4-lobed; lobes obtuse, shorter than the tube. Corolla large, $\frac{1}{2}$–$\frac{3}{4}$ in. long, white with a yellow eye, sometimes with purplish streaks, pilose externally; upper lip 2-lobed, lobes emarginate; lower lip 3-lobed. Capsule linear-cuneate, emarginate, hairy or at length glabrous, exceeding the calyx. Seeds numerous, elongate.—*A. Rich. Fl. Nouv. Zel.* (1832) 191; *A. Cunn. Precur.* (1838) n. 384; *Raoul Choix* (1846) 43; *Hook. f. Fl. Nov. Zel.* i (1853) 199; *Handb. N.Z. Fl.* (1864) 219; *Wettst. Monog. Euphr.* (1896) 247, t. v, f. 369–74, *and* t. xiv, f. 1; *Cheesem. Man. N.Z. Fl.* (1906) 553.

Var. **tricolor** *Cheesem. l.c.* 554. — Principally montane or subalpine. Stems shorter and not so much branched; leaves shorter and broader, on shorter petioles; flowers spicate along the upper part of the branches.—E. tricolor *Col. in Trans. N.Z. Inst.* xix (1887) 264.

North Island: From the East Cape, Mount Egmont, and Lake Taupo southwards to Cook Strait, not uncommon, especially in mountainous localities. South Island: D'Urville Island, abundant, *H. J. Matthews!* plentiful on sea-cliffs in Queen Charlotte and Pelorus Sounds, *J. H. Macmahon!*

A distinct species, well marked by the large size, much-branched perennial habit, cuneate leaves narrowed into a distinct petiole, large pedicelled flowers and long narrow capsule. The extreme state of var. *tricolor* has a very distinct appearance; but there is no difficulty in tracing an absolutely gradual passage into the ordinary form.

2. **E. Monroi** *Hook. f. Handb. N.Z. Fl.* (1864) 220.—Perennial, sometimes woody at the very base; stems erect or decumbent below, 3–8 in. high, leafy above, sparingly branched, faintly bifariously pubescent. Leaves rather close-set, spreading, $\frac{1}{3}$–$\frac{1}{3}$ in. long, obovate or obovate-spathulate, obtuse, narrowed to the base but not evidently petiolate, coriaceous, glabrous, furnished with 1 or 2 short obtuse teeth on each side; margins thick, recurved. Flowers in short few-flowered leafy spikes towards the ends of the branches, sessile or very shortly peduncled; bracts similar to the leaves. Calyx 4-lobed; lobes short, thick, obtuse or subacute, margins recurved. Corolla $\frac{1}{2}$–$\frac{2}{3}$ in. long; tube funnel-shaped, exceeding the calyx; upper lip bilobed, lower lip trilobed; lobes retuse. Capsule obovate, retuse, equalling the calyx or slightly longer than it.—*Wettst. Monog. Euphr.* (1896) 248, t. v, f. 375–82, *and* t. xiv, f. 2; *Cheesem. Man. N.Z. Fl.* (1906) 554.

South Island: Not uncommon on the mountains of Nelson and Marlborough. Canterbury—Hurunui Mountains, *W. T. L. Travers;* Lake Tennyson, *R. M. Laing;* Southern Alps, *Sinclair* and *Haast;* Mount Arrowsmith, *Cockayne* and *R. M. Laing;* Franz Josef Glacier, *Cockayne.* 3000–5000 ft. December–March.

Very closely allied to *E. cuneata*, but a smaller much more sparingly branched plant, with close-set uniform leaves not obviously petiolate and with the margins recurved. It is also without the copious branched inflorescence of the typical state of *E. cuneata*, the flowers being few towards the tips of the branches. It should be mentioned that in both *E. cuneata* and *E. Monroi* it is only a part of the plant which is perennial, the flower-bearing branchlets perishing during winter, their places being taken by new shoots produced during the following season.

3. **E. Laingii** *Petrie in Trans. N.Z. Inst.* xliv (1912) 184.—Perennial, almost woody at the base, 3–8 in. high; stems decumbent below, erect above, bifariously pubescent. Leaves in rather distant pairs, erect, $\frac{1}{6}$–$\frac{1}{3}$ in. long, oblong-cuneate, obtusely 3-lobed at the tip, the median lobe much the widest, narrowed to a sessile base, coriaceous, glabrous, margins more or less recurved. Inflorescence of leafy spike-like racemes often 4 in. long or more; bracts large, gradually passing into the leaves. Flowers in opposite pairs, pedicellate, the pedicels as long as the bracts. Calyx 4-lobed, lobes subacute, narrow-triangular, veined. Corolla large, $\frac{1}{2}$–$\frac{2}{3}$ in. long; tube funnel-shaped; limb large, spreading. Capsule oblong-cuneate, rather shorter than the enlarged calyx; seeds 8–10 in each cell.

South Island: Canterbury—Craigieburn Mountains, *Cockayne, Petrie!* Mount Peel, Mount Winterslow, *R. M. Laing!* Hooker Valley, Mount Cook district, *T. F. C., Petrie!* 3000–5000 ft. December–February.

Closely allied to *E. Monroi*, with which it agrees in the erect stems, coriaceous leaves, and in the large narrow-obovoid capsule. The narrow-cuneate erect leaves are probably its best mark.

4. **E. Townsoni** *Petrie in Trans. N.Z. Inst.* xliv (1912) 185.—Annual or subperennial, often much branched from the base. Stems somewhat stout, decumbent below, erect above, 2–3½ in. high, densely bifariously pubescent with short crisped white hairs, which are more or less glandular. Leaves in remote opposite pairs, sessile, $\frac{1}{6}$–$\frac{1}{4}$ in. long, narrow ovate-rhomboid, cuneate at the base, furnished with 1–2 large teeth on each side and a prominent terminal one; margins reflexed. Flowers 2–4 towards the tips of the branches, often opposite in the axils of the uppermost leaves, large, peduncled, $\frac{1}{3}$–$\frac{1}{2}$ in. long, bright-yellow with darker

veins; peduncles 2–3 times as long as the leaves, slender, pubescent. Calyx 4-lobed to $\frac{1}{3}$-way down or more; lobes ovate-lanceolate, acute. Corolla-tube longer than the calyx; limb wide-spreading, upper arched, 2-lobed; lower lip 3-lobed. Capsule not exceeding the calyx; seeds many, 8–12 in each cell.

South Island: North-west Nelson—Mount Rochfort, Mount Murchison, Mount Lyell, *W. Townson!* Denniston, *J. Caffin!* Mount Frederic, Millerton, *P. G. Morgan!* Buckland Peaks, *Petrie!* 1500–4000 ft. December–February.

A distinct species, easily distinguished by the narrow ovate-rhomboid leaves, large yellow flowers, and long slender peduncles.

5. **E. revoluta** *Hook. f. Fl. Nov. Zel.* i (1853) 199.—Annual, or sometimes the rootstock perennial. Stems 1–4 in. high, very slender, much or sparingly branched from the base, often creeping and putting up few or many ascending branchlets, more or less glandular-pubescent. Leaves in rather distant pairs, sessile, very variable in size, the lowest usually the smallest, $\frac{1}{8}$–$\frac{1}{2}$ in. long, obovate-cuneate, obtuse or subacute, narrowed to the base, furnished with 1–3 teeth on each side, glandular-pubescent or glabrous, margins revolute. Flowers few towards the tips of the branches, large, $\frac{1}{2}$–$\frac{3}{4}$ in. diam.; peduncles shorter or longer than the leaves. Calyx shortly 4-lobed; lobes triangular, acute, much shorter than the tube. Corolla-tube funnel-shaped, exceeding the calyx; limb spreading; upper lip 2-lobed; lower lip 3-lobed, lobes deeply emarginate. Capsule oblong, obtuse; seeds numerous in each cell.—*Handb. N.Z. Fl.* (1864) 220; *Wettst. Monog. Euphr.* (1896) 266, t. xiv, f. 8; *Cheesem. Man. N.Z. Fl.* (1906) 554.

North Island: Mount Hikurangi, *S. Dodgshun;* central volcanic plateau, *Cockayne, T. F. C.;* Ruahine Mountains, *Colenso! H. Hill! Petrie!* Kaimanawa Mountains, *B. C. Aston;* Tararua Mountains, *Buchanan! Petrie!* South Island: Not uncommon in mountain districts throughout. 2000–5500 ft. December–March.

A very variable plant, best distinguished by the tender and much divided habit of growth, unusually large flowers, and very long slender peduncles.

6. **E. australis** *Petrie in Trans. N.Z. Inst.* xliii (1911) 255.—Very variable in size and habit, usually slender and diffusely branched, 4–8 in. high or even more, pubescent with short white hairs. Leaves usually in sparsely placed pairs, $\frac{1}{4}$–$\frac{1}{3}$ in. long, varying in shape from ovate-orbicular to ovate-oblong, shortly petiolate, 3–4-lobed on either side with a broader terminal one, firm but scarcely coriaceous, glabrous or nearly so, distinctly veined; margins recurved. Flowers rather large, in axillary opposite pairs, $\frac{1}{4}$–$\frac{1}{3}$ in. long; peduncles often 2 or 3 times as long as the leaves, pubescent with whitish hairs. Calyx 4-lobed, pubescent, lobes short, obtuse, margins recurved. Corolla whitish, funnel-shaped; throat expanded; upper lip short, obtuse; lower lip much reflexed, 3-lobed. Capsule broadly obovoid or turbinate. Seeds 4–5 in each cell.

South Island: Nelson—Westport district, *W. Townson!* Otago—Routeburn, Clinton Saddle, *Petrie! J. W. Murdock!* Lake Manapouri, Lake Hauroto, *J. Crosby Smith.* 3000–5000 ft.

In the first edition of this work I included this in *E. revoluta.* Mr. Petrie considers it to be allied to his *E. Cockayniana,* but it is a larger plant, with differently toothed leaves.

7. **E. Cockayniana** *Petrie in Trans. N.Z. Inst.* xxvi (1894) 269.—Annual. Stems slender, erect, 2–5 in. high, sparingly branched from the base; branches ascending, more or less clothed with short crisp glandular pubescence. Leaves in remote opposite pairs, $\frac{1}{5}$–$\frac{1}{3}$ in. long, ovate or rhomboid-ovate, subacute, cuneate at the base, furnished with 2–3 rather large teeth on each side, both surfaces more or less glandular-pubescent, margins reflexed. Flowers few towards the tips of the branches, sessile or very shortly peduncled, nearly $\frac{1}{2}$ in. long, bright-yellow. Calyx oblong-campanulate, 4-lobed to the middle, lobes subacute. Corolla-tube longer than the calyx; upper lip 2-lobed, lobes entire; lower lip 3-lobed, lobes emarginate. Capsule broadly oblong, included in the enlarged calyx, glabrous or nearly so.—*Cheesem. Man. N.Z. Fl.* (1906) 556. E. Berggreni *Wettst. Monog. Euphr.* (1896) 265, f. 4, 5.

South Island: Canterbury and Westland—Arthur's Pass, *Berggren, T. Kirk! Cockayne! T. F. C.;* Kelly's Hill, *Petrie!* Griffin Range, *P. G. Morgan!* 3000–5000 ft. December–March.

Closely allied to *E. zealandica*, from which, however, it is readily separated by the bright-yellow flowers and the larger corolla.

8. **E. zealandica** *Wettst. Monog. Euphr.* (1896) 264, t. vi, f. 430–35, and t. xiv, f. 10.—Annual. Stems slender, erect, 1–4 in. high, much or sparingly branched from the base, or in depauperated specimens simple, more or less bifariously pubescent with short crisp white hairs; branches spreading or ascending, sometimes prostrate. Leaves in distant opposite pairs, sessile, $\frac{1}{6}$–$\frac{1}{3}$ in. long, ovate, obtuse or subacute, cuneate at the base, furnished with 2–4 rather large teeth on each side, both surfaces glandular-pubescent, margins reflexed. Flowers few towards the tips of the branches, sessile or very shortly pedicelled, $\frac{1}{4}$–$\frac{1}{3}$ in. long, white; peduncles elongating in fruit. Calyx oblong-campanulate, 4-lobed; lobes usually shorter than the tube. Corolla-tube scarcely longer than the calyx; upper lip short, arched, 2-lobed; lower lip 3-lobed; all the lobes entire. Capsule broad, almost orbicular, scarcely exceeding the enlarged calyx; seeds several in each cell.—*Cheesem. Man. N.Z. Fl.* (1906) 555. E. antarctica *Hook. f. Fl. Nov. Zel.* i (1853) 199; *Handb. N.Z. Fl.* (1864) 220 (*not of Benth.*). E. pygmaea *Col. in Trans. N.Z. Inst.* xxxi (1899) 279.

North Island: Central volcanic plateau, *T. F. C., Spencer!* Ruahine Mountains, *Colenso! Tryon! Olsen! B. C. Aston!* Kaimanawa Mountains, *B. C. Aston!* Tararua Mountains, *B. C. Aston! Petrie;* Upper Wairarapa, *Buchanan!* South Island: Not uncommon in mountain districts throughout. 2000–6000 ft. December–March.

Distinguished from *E. revoluta* by the different habit, much more conspicuously toothed leaves, and much smaller flowers; from *E. Cockayniana* by the smaller flowers, which are never altogether yellow; and from *E. Cheesemanii* by the almost sessile flowers, shorter and narrower corolla, and especially by the numerous ovules.

9. **E. integrifolia** *Petrie in Trans. N.Z. Inst.* xlvii (1915) 53.—Minute, creeping and rooting, loosely matted, 2–3 in. long. Stems slender, glabrous, putting out several branches from the axils of the lower leaves. Leaves closely placed in opposite pairs, $\frac{1}{8}$–$\frac{1}{6}$ in. long, sessile but not connate at the base, glabrous, linear-lanceolate, long acuminate, submembranous; veins obscure. Flowers few in the axils of the upper leaves, large for the size of the plant, $\frac{1}{8}$–$\frac{1}{6}$ in. long, nearly sessile, white with a purple streak at the back of each lobe of the corolla, campanulate, glabrous, shortly cut into

E. lectori Petrie Trans 56:1926:15. Haast Valley

4 triangular acute lobes; corolla-tube rather wide; upper lip short, barely arched, broadly emarginate; lower lip divided into 3 short rounded lobes. Anthers exserted when mature. Style long. Capsule about as long as the calyx, obovoid, compressed, glabrescent; seeds several in each cell.

South Island: Southland—Wet alpine bogs and meadows on Mount Cleughearn, Fiord County, alt. 5000 ft., *J. Crosby Smith!* 75 : 194

A very remarkable little plant, differing from any other New Zealand species in the perfectly entire leaves. I have only seen very imperfect specimens, and the description given above is mainly taken from that originally drawn up by Mr. Petrie.

10. **E. Cheesemanii** *Wettst. in Osterr. Bot. Zeit.* (1900) 381, f. 1–5.—A slender annual herb 1½–2½ in. high, much branched from the base; branches spreading or ascending, minutely pubescent. Leaves small, sessile, shorter than the internodes, ⅙–⅓ in. long, ovate or obovate-cuneate, obtuse, more or less clothed with short crisp glandular pubescence, margins with 2–4 obtuse teeth on each side. Flowers axillary towards the tips of the branches, rather remote, large for the size of the plant, ⅓–½ in. long; peduncles long, slender, ⅓–¾ in. long. Calyx campanulate, shortly 4-lobed; lobes obtuse, sparsely glandular-pubescent. Corolla broadly funnel-shaped; tube much longer than the calyx; upper lip short, 2-lobed; lower lip 3-lobed; lobes obtuse. Ovary pubescent, with 2 superposed ovules in each cell. Capsule obovate, compressed, slightly longer than the calyx.—*Cheesem. Man. N.Z. Fl.* (1906) 556.

South Island: Nelson—Mount Arthur Plateau and Mount Owen, *T. F. C.*; Cobb Valley, *F. G. Gibbs!* Mount Mantell and Brunner Range, *W. Townson!* 3500–5000 ft. December–February.

This has much of the appearance of *E. zealandica*, but can be distinguished by the longer peduncles, fruiting-calyx not conspicuously enlarged, longer and narrower corolla, and by the ovary having only 2 ovules in each cell.

11. **E. Dyeri** *Wettst. Monog. Euphr.* (1896) 267, f. 6, 7.—A minute delicate annual herb ½–1½ in. high, branched from the base; branches weak, spreading, not rooting. Leaves in opposite pairs, 1/10–⅙ in. long, broadly obovate in outline or broader than long, deeply 5-lobed or more rarely 3-lobed; lobes flat, erect, acute, minutely setulose on the margins. Flowers axillary, solitary, ¼ in. long; peduncles usually short but sometimes equalling the leaves. Calyx campanulate, 4-lobed half-way down; lobes flat, acute, minutely setulose. Corolla-tube longer than the calyx, sometimes ⅔ as long again, curved below, limb with the upper lip short, broad, concave, shortly 2-lobed; lower lip 3-lobed. Anthers cohering. Ovary pubescent; ovules 2 in each cell, pendulous. Capsule obovate-oblong, compressed, shorter than the calyx.—*Cheesem. Man. N.Z. Fl.* (1906) 556.

South Island: Otago—Mount Kyeburn, Mount Buster, *Petrie!* summit of Maungatua, *Thomson! B. C. Aston!* Longwood Range, *Cockayne;* Routeburn and Garvie Mountains, *Poppelwell.* Stewart Island: Near Port Pegasus, *T. Kirk!* Table Cape, *Cockayne.* 500–4500 ft. December–January.

12. **E. umbellata** *Petrie in Trans. N.Z. Inst.* xliii (1911) 256.—A small much-branched perfectly glabrous creeping and rooting annual herb, often forming patches of some size, upper branches short, suberect, sparingly leafy. Leaves in distant opposite pairs, very small, 1/10–⅛ in. long, sessile, oblong-cuneate, cut about ⅔-way down into 5 (or rarely 7) linear-subulate lobes. Flowers solitary in the axils of the upper leaves or very

rarely 2 on the same peduncle, large for the size of the plant, $\frac{1}{3}$ in. long or even more. Peduncles long, capillary, $\frac{1}{2}$ in. long. Calyx oblong-campanulate; lobes 4, flat, linear-subulate, acute. Corolla narrow funnel-shaped; tube long; limb erect. Anthers glabrous.

South Island: Southland — Marshes near the mouth of the Oreti River, *T. Kirk! J. Crosby Smith!* Trans: 43 : 256.

I regard this as nothing more than a large state of *E. repens*, from which it does not seem to differ except in the larger size and in the greater number of lobes to the leaves. Mr. Petrie, however, who has paid great attention to the genus, considers it to be distinct.

13. **E. repens** *Hook. f. Fl. Nov. Zel.* i (1853) 200.—A minute very slender creeping and rooting glabrous or puberulous herb; branches prostrate, almost filiform, 1–4 in. long, rooting at the nodes. Leaves minute, in rather remote pairs, sessile, $\frac{1}{12}$–$\frac{1}{10}$ in. long, cuneate, deeply 3-lobed; lobes flat, acute, erect. Flowers axillary and solitary, erect, large for the size of the plant, $\frac{1}{3}$–$\frac{1}{2}$ in. long; peduncles slender, exceeding the leaves, sometimes $\frac{1}{3}$ in. long. Calyx 4-lobed to about $\frac{1}{3}$-way down; lobes flat, erect, acute. Corolla-tube slender, curved, more than twice as long as the calyx; upper lip short, broad, shortly 2-lobed; lower lip 3-lobed. Anthers glabrous or nearly so. Ovary pubescent; ovules 2 in each cell, pendulous. Ripe capsules not seen.—*Handb. N.Z. Fl.* (1864) 221; *Wettst. Monog. Euphr.* (1896) 253; *Cheesem. Man. N.Z. Fl.* (1906) 556.

South Island: Southland—Bluff Island, *Lyall;* Ocean Beach, near the Bluff, *J. Crosby Smith!* Stewart Island: "Common on Dog, Centre, and Ruapuke Islands, but rare on Stewart Island," *Cockayne.*

A very remarkable little plant. I have had no opportunity of comparing specimens from Stewart Island with others from the locality in which it was first discovered by *Lyall.*

See Du Rietz Sv. Bot. Tids. 25, H 1, 1931. 108.

10. **SIPHONIDIUM** J. B. Armstr. 1881

A small creeping intricately branched herb. Leaves opposite, entire or 3-lobed. Flowers solitary and axillary, erect, shortly peduncled. Calyx oblong-campanulate, 5-lobed to the middle; lobes equal, ovate-lanceolate, acute. Corolla-tube excessively long and slender, 1–2 in. long, narrow at the base, gradually expanded above; limb short, 2-lipped; upper lip erect, obcordate, shortly 2-lobed; lower lip rather shorter, spreading or deflexed, 3-lobed. Stamens 4, didynamous; anthers large, almost as long as the lower lip of the corolla, mucronate at the base. Ovary small, broadly ovoid, 2-celled; ovules solitary, pendulous from the top of the cell. Style slender; stigma circinately incurved. Capsule broadly obcuneate, much broader than long, loculicidally dehiscent, compressed. Seeds one in each cell, large, oblong, pendulous.

A very remarkable monotypic genus, confined to New Zealand. It is closely allied to *Euphrasia*, but differs in the extraordinary length of the corolla-tube, in the solitary ovules, and in the broad obcuneate capsule.

E. wettsteiniana Du Rietz.

1. **S. longiflorum** *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 341.—Stems very slender, weak, procumbent and matted, 2–4 in. long, sparsely glandular-pubescent. Leaves in rather remote pairs, sessile or nearly so, $\frac{1}{6}$–$\frac{1}{4}$ in. long, ovate-lanceolate, acuminate, narrowed to the base,

entire or deeply 3-lobed, 3-nerved, glabrous or glandular-pubescent. Flowers on short curved peduncles, erect. Corolla about $\frac{1}{2}$–$\frac{3}{4}$ in. long when first expanded, but elongating as the flowering advances and often becoming 2 in. long, very many times longer than the small calyx. Capsule $\frac{1}{10}$–$\frac{1}{8}$ in. long, very much broader than long.—*Cheesem. Man. N.Z. Fl.* (1906) 558. Euphrasia longiflora *T. Kirk in Trans. N.Z. Inst.* xi (1879) 440 (*not of Vahl*). E. (Anagosperma) disperma *Hook. f. Ic. Plant.* (1879) t. 1283; *T. Kirk l.c.* xii (1880) 396, t. 14. Anagosperma dispermum *Wettst. in Deutsch Bot. Ges.* xiii (1895) 242; *Cheesem. Man. N.Z. Fl.* (1906) 557.

South Island: Nelson—Karamea, *Spencer!* Mount Rochfort and most of the coastal mountains north and south of it, *W. Townson! Spencer! Dr. Gaze!* and many others. Westland—Paparoa Range, *Helms!* Ahaura Plain, Lake Brunner, Teremakau Paddock, *T. Kirk!* Okarito, *A. Hamilton!* 250–3500 ft. January–March.

There can be no doubt that this plant is identical with both Armstrong's *Siphonidium* and Wettstein's *Anagosperma*; and as Armstrong's name is the oldest it must take precedence.

Family XCIV. **GESNERIACEAE.**

Herbs or shrubs. Leaves generally opposite or whorled, simple, entire or toothed; stipules wanting. Flowers usually irregular, hermaphrodite, in axillary or terminal racemes or cymes, or solitary. Calyx inferior or semi-superior, 5-partite; segments valvate. Corolla gamopetalous, usually irregular; tube long or short; limb more or less oblique, lobes 4–5, imbricate. Stamens 2 or 4, inserted on the tube of the corolla; anthers 2-celled. Ovary superior or more rarely inferior, 1-celled; style linear; stigma capitate or 2-lobed; ovules many, anatropous, on two opposite entire or bifid parietal placentas. Fruit capsular or berried, dehiscent or indehiscent. Seeds numerous, small; albumen present or absent; embryo straight.

A tolerably large family, almost wholly confined to tropical regions. Genera 80; species under 1100. The family includes many handsome greenhouse plants, especially of the genera *Gloxinia* and *Achimenes*, but otherwise its economic properties are unimportant. The single New Zealand genus is endemic.

RHABDOTHAMNUS A. Cunn. 1838

A much-branched shrub; branches spreading, scabrid-pubescent. Leaves opposite. Flowers solitary, axillary. Calyx free, deeply 5-fid; lobes lanceolate, acuminate. Corolla-tube subcampanulate; limb obscurely 2-lipped; lobes 5, rounded, spreading, nearly equal. Stamens 4 with the rudiments of a fifth, inserted on the corolla-tube below the middle; filaments long, linear, arched; anthers cohering at the apex in a cruciate manner; cells distinct, parallel. Disc small, obscure, annular. Ovary superior, ovoid; style filiform; stigma 2-lobed; ovules numerous, on thick and prominent 2-lobed placentas. Capsule ovoid, acuminate, coriaceous, 2-valved; valves 2-fid, separating from the placentas. Seeds numerous, minute, ovoid.

A monotypic genus confined to the North Island of New Zealand. It is closely allied to the New Caledonian *Coronanthera* and the Lord Howe Island *Negria*.

1. **R. Solandri** *A. Cunn. Precur.* (1838) n. 385. — Slender, much branched, 2–5 ft. high; branches opposite, terete, everywhere rough with short stiff greyish pubescence. Leaves on slender petioles; blade variable in size, usually $\frac{1}{2}$–1 in. long, but sometimes over 2 in., broadly ovate or orbicular, coarsely toothed, both surfaces rough with short scabrid hairs, dull-green. Flowers handsome, $\frac{3}{4}$–1 in. long, orange with red stripes; peduncles slender, $\frac{1}{2}$–$1\frac{1}{2}$ in. long. Capsule $\frac{1}{4}$–$\frac{1}{3}$ in. long, included within the persistent calyx. — *Raoul Choix* (1846) 44; *Hook. f. Fl. Nov. Zel.* i (1853) 186; *Handb. N.Z. Fl.* (1864) 221; *C. B. Clarke in DC. Monog. Phan.* v (1883) 166, t. 17; *Cheesem. Man. N.Z. Fl.* (1906) 562; *Ill. N.Z. Fl.* ii (1914) t. 160. R. scabrosus *Steud. Nom.* ed. 2, ii, 443. Columnea scabrosa *Sol. ex DC. Prodr.* ix (1845) 277.

North Island: Lowland districts from the North Cape southwards to Wellington, but rare and local to the south of the Auckland Province. Sea-level to 2000 ft. *Waiuatua; Matata.* Flowers most of the year.

For an account of the fertilization, see a paper by Mr. Petrie in Trans. N.Z. Inst. xxxv (1903) 321.

Family XCV. **LENTIBULARIACEAE.**

Herbs, either aquatic or growing in wet soil. Leaves in the terrestrial species radical, few or rosulate, entire; in the aquatic species more or less scattered, capillary and multifid. Flowers irregular, hermaphrodite, either solitary or several on a scapiform peduncle. Calyx inferior, 2-lipped or 4–5-partite. Corolla gamopetalous, hypogynous, irregular, the tube usually produced into a spur or pouch, the limb 2-lipped, upper lip entire or 2-lobed, lower lip 3–5-lobed. Stamens 2, inserted at the base of the corolla-tube; filaments usually broad, arched; anthers 1-celled. Ovary superior, globose, 1-celled; style short and thick; stigma 2-lobed; ovules numerous, on a free central placenta. Fruit a capsule, either bursting irregularly or 2–4-valved. Seeds numerous, small; albumen wanting; embryo either undivided or with very short cotyledons.

A small but very distinct family, comprising 5 genera and about 250 species. It is remarkable on account of the roots or leaves often being provided with small bladder-like appendages, which catch minute aquatic animals. The single genus found in New Zealand is almost world-wide in its distribution.

UTRICULARIA Linn. 1735

Slender herbs, floating or terrestrial. Leaves of the terrestrial species all radical, inconspicuous or fugacious; of the floating species scattered, multifid with capillary segments, furnished with floating bladders. Peduncles or scapes radical or axillary, either 1-flowered or bearing a few- or many-flowered raceme or spike. Calyx 2-partite; segments entire or nearly so, often enlarged in fruit. Corolla spurred at the base, 2-lipped; upper lip erect, entire or 2-lobed; lower lip larger, spreading, 3–6-lobed, with a palate projecting into the throat and almost closing the flower. Stamens 2; filaments incurved. Style short; stigma unequally 2-lobed. Capsule globose or nearly so, 2-valved or bursting irregularly. Seeds many.

A large genus of world-wide distribution, the species probably numbering close upon 220. With the exception of *U. monanthos*, which extends to Tasmania, all the New Zealand species are endemic. They are also very imperfectly known, and require a careful study from fresh specimens.

A. Stems floating. Leaves submerged, multifid; segments capillary.

Stems often several feet in length; branches with the leaves on 1½–3 in. across	1. *U. protrusa.*
Stems 2–6 in. long; branches with the leaves on ½ in. across	2. *U. Mairii.*

B. Plants stemless, growing in bogs or wet soil. Leaves all radical, few, small, narrow-linear, entire.

Flowers pale-purple. Upper lip of corolla not 2-lobed; lamina of lower lip broad, entire; spur short, obtuse	3. *U. novae-zealandiae.*
Flowers white. Upper lip of corolla 2-lobed; lamina of lower lip broad, entire; spur long, acute, minutely 2-horned at the tip	4. *U. delicatula.*
Upper lip of corolla 2-lobed; lamina of lower lip 3-lobed ..	5. *U. Colensoi.*
Flowers dark violet-purple. Upper lip of corolla cuneate, retuse; lamina of lower lip very broad; spur short ..	6. *U. monanthos.*

1. **U. protrusa** *Hook. f. Fl. Nov. Zel.* i (1853) 206.—Stems floating in still water, branched, often extending to a length of several feet, slender, filiform. Leaves numerous, all submerged, spreading, pinnately multipartite; segments many, filiform; bladders numerous, about ⅛ in. long, obliquely ovoid, shortly pedicelled, attached near the base of the segments. Scape stout, erect, 2–4-flowered. Sepals oblong. Corolla yellow; upper lip 3-lobed; lower broader, subquadrate, its disc protruded, margins recurved. Spur short, obtuse.—*Handb. N.Z. Fl.* (1864) 509; *Cheesem. Man. N.Z. Fl.* (1906) 559.

North Island: Auckland—Lake Tongonge, near Ahipara, *R. H. Matthews! H. Carse!* Lake Waihi, Waikato, *T. Kirk, T. F. C.;* Bay of Plenty, *Colenso;* Waiharakeke Stream, near Morrinsville, *P. H. Allen!*

Mr. Allen's specimens are in full flower, and are the first found in that condition since the original discovery of the species by Mr. Colenso in 1842.

2. **U. Mairii** *Cheesem. Man. N.Z. Fl.* (1906) 560.—Stems floating in still water, sparingly branched, 2–6 in. long, stouter than in the preceding species. Leaves numerous, all submerged, spreading, about ¼ in. long, pinnately divided into numerous capillary segments; segments broader than in *U. protrusa;* bladders numerous, about $\frac{1}{10}$ in. long, attached to the segments. Flowers not seen.

North Island: Auckland—Lake Rotomahana, *T. Kirk* and *G. Mair!* (1872).

This is certainly distinct from the Lake Waihi and Lake Tongonge plant, which has stems several feet in length, and the branches of which, with the spreading leaves, are from 1½–3 in. across. In *U. Mairii* the stems are much shorter and stouter, and the branches with the leaves on are only about ½ in. across. *U. Mairii* was destroyed in the Rotomahana locality by the eruption of 1886, but it probably occurs in some of the lakes in the Rotorua district.

3. **U. novae-zealandiae** *Hook. f. Fl. Nov. Zel.* i (1853) 206.—Stemless. Roots slender, creeping, bearing numerous shortly pedicelled bladders about ⅛ in. diam. when fully grown. Leaves 1–3, all radical, often disappearing at the time of flowering, ¼–¾ in. long, rarely more, very narrow-linear or linear-spathulate, quite entire, rather fleshy, 1-nerved. Scape or peduncle very slender, variable in length, 3–9 in. high or more, simple, erect, 1–4-flowered; bracts small, opposite or in threes. Flowers shortly pedicelled, ¼–⅓ in. long, pale-purple with a yellow eye. Upper calyx-segment orbicular or nearly so, rounded or slightly retuse at the tip; lower rather smaller, concave, 2-lobed. Upper lip of the corolla much

the smaller, narrow cuneate-oblong, constricted below the middle, truncate or nearly so at the tip; lower lip with a broad horizontal almost semicircular lamina about $\frac{1}{3}$ in. diam., margin entire; palate with three raised ridges, each with a central groove; spur short, broad, obtuse. Capsule membranous, globose, $\frac{1}{6}$ in. diam.—*Handb. N.Z. Fl.* (1864) 222; *Cheesem. Man. N.Z. Fl.* (1906) 560; *Ill. N.Z. Fl.* ii (1914) t. 159. U. subsimilis *Col. in Trans. N.Z. Inst.* xvi (1884) 334.

North Island: Auckland—Lake Ohia (near Mangonui), *T. F. C.;* Great Barrier Island, *T. Kirk!* near Helensville, *W. T. Ball!* Taupaki (Kaipara Railway), *T. F. C.;* near Waiuku, *H. Carse!* Waihi, *Petrie!* Lake Taupo, *A. Hamilton!* Taranaki—Ngaire Swamp, *T. F. C.* Wellington—Palliser Bay, *Colenso.* South Island: Canterbury Plains, *J. B. Armstrong;* Ashburton, *H. H. Allan!* November–January.

Probably not uncommon in peaty swamps throughout the North Island, and in the eastern portion of the South Island.

4. **U. delicatula** *Cheesem. Man. N.Z. Fl.* (1906) 561.—Habit of *U. novae-zealandiae,* but much smaller, the scape seldom more than 3 in. high. Leaves 1 or 2 or wanting, narrow-linear or narrow linear-spathulate, quite entire. Scape 1–3 in. high, slender, wiry, erect, 1–3-flowered; bracts very small. Flowers shortly pedicelled, about $\frac{1}{5}$ in. long, white with a faint yellow eye. Calyx-segments almost equal, suborbicular, concave. Upper lip of corolla the smaller, linear-oblong, 2-lobed at the tip; lower lip with a horizontally spreading lamina which is quite entire, not 3-lobed; palate very obscurely thickened or quite plane; spur longer than in *U. novae-zealandiae,* minutely 2-horned at the tip. Capsule globose, membranous, about $\frac{1}{5}$ in. diam.—*Ill. N.Z. Fl.* ii (1914) t. 159B.

North Island: Auckland—Near Kaitaia, *T. F. C.;* near Waiuku, *H. Carse!* swamps near Ohaupo (Waikato), *T. F. C.* November–January.

This differs from *U. novae-zealandiae* in the smaller size, in the upper lip of the corolla being 2-lobed, and in the longer spur, which is minutely 2-horned at the tip. From *U. Colensoi* it is at once separated by the entire lower lip.

5. **U. Colensoi** *Hook. f. Fl. Nov. Zel.* i (1853) 206.—"Altogether like *U. novae-zealandiae* but with the upper lip of the corolla linear-oblong, 2-lobed; lower broadly cuneate, 3-lobed, middle lobe retuse, disc with 3 gibbous prominences."—*Handb. N.Z. Fl.* (1864) 223; *Cheesem. Man. N.Z. Fl.* (1906) 561. (?) U. vulcanica *Col. in Trans. N.Z. Inst.* xxvi (1894) 318.

North Island: East Coast, *Colenso* (Handbook).

This does not seem to have been collected since its first discovery more than seventy years ago, unless Colenso's *U. vulcanica* be the same species. Mr. Colenso describes his plant as having a 3-lobed lower lip, but he also states that the upper lip is "subovate, obtuse," which is at variance with Hooker's description. Unfortunately, the type specimens of both species have been lost, so that no comparison can now be made.

6. **U. monanthos** *Hook. f. Fl. Tasm.* i (1860) 299.—A minute stemless herb. Roots or rhizome very slender, bearing several subglobose compressed bladders $\frac{1}{15}$–$\frac{1}{10}$ in. diam. Leaves few, all radical, $\frac{1}{4}$–1 in. long, narrow linear-spathulate, petiolate, quite entire. Scape slender, simple, erect, $\frac{3}{4}$–4 in. high, 1- or rarely 2-flowered. Flowers large for the size of the

plant, $\frac{1}{3}$ in. diam. or more, dark violet-purple with a yellow eye. Calyx-segments oblong, obtuse. Upper lip of corolla much the smaller, broadly cuneate, retuse; lower lip expanded into a broad semicircular horizontally spreading lamina; palate glandular; spur short, obtuse. Capsule globose, membranous. — *Handb. N.Z. Fl.* (1864) 222; *Cheesem. Man. N.Z. Fl.* (1906) 561.

North Island: Rangipo Plain, near Ruapehu, *Petrie!* Kakaramea, base of Tongariro, bogs on the Waimarino Plains, *T. F. C.*; Kaimanawa Mountains, *B. C. Aston!* South Island, Stewart Island: Not uncommon in peat bogs in mountainous localities. Sea-level to 3500 ft. December–March.

Easily recognized by the large dark-purple flowers. For a description of the bladders, and for some notes on the fertilization, see Mr. G. M. Thomson's paper on the fertilization of New Zealand flowering-plants (Trans. N.Z. Inst. xiii (1881) 278).

Family XCVI. **MYOPORACEAE.**

Shrubs or trees. Leaves alternate or scattered, rarely opposite, simple, entire or toothed; stipules wanting. Flowers hermaphrodite, irregular or almost regular. Calyx inferior, persistent, 5-partite or 5-fid. Corolla gamopetalous, hypogynous, 5-lobed; lobes imbricate. Stamens 4, didynamous, rarely 5–6, inserted at the base of the corolla-tube; anthers introrse, cells confluent. Ovary superior, not lobed, normally 2-celled with 2 (rarely more) pendulous ovules in each cell, but sometimes the cells are more or less completely divided into 2, with a single ovule in each cell, or very rarely the cells may be as many as 5–10; style terminal; stigma small, entire or emarginate. Fruit drupaceous, indehiscent, succulent or almost dry, 2–4-celled. Seeds solitary in each cell; albumen scanty, fleshy; embryo straight; radicle superior, next the hilum.

A small family, almost confined to Australia, a few species only being found in the Pacific islands, the Malay Archipelago, and South Africa, and one monotypic genus in the West Indies. Genera 5; species about 100. The properties of the family are unimportant.

MYOPORUM Banks and Sol. 1786

Shrubs or small trees, glabrous or the branchlets glutinous. Leaves alternate, entire or serrate, studded with pellucid glands. Flower small, axillary, solitary or fascicled. Calyx 5-lobed or -partite, not enlarged after flowering. Corolla campanulate; tube short; limb 5-lobed, lobes subequal or the lowest rather larger. Stamens 4, rarely 5 or 6, nearly equal, included or shortly exserted. Ovary ovoid, 2–4-celled, very rarely 5–10-celled, with 1 ovule in each cell, rarely 2-celled with 2 ovules in each cell. Drupe ovoid or subglobose, more or less succulent.

A genus of about 25 species, mostly Australian, the rest scattered through the Pacific islands, the Malay Archipelago, China and Japan, and Mauritius. The single New Zealand species is endemic, but is very closely allied to some from the Pacific islands.

1. **M. laetum** *Forst. f. Prodr.* (1786) 44.—A shrub or small tree 8–25 ft. high; trunk 9–18 in. diam.; bark brown, thick and furrowed; branches spreading, viscid at the tips. Leaves $1\frac{1}{2}$–4 in. long, lanceolate to oblong-lanceolate or obovate, acute or acuminate, narrowed into petioles $\frac{1}{2}$–1 in. long, serrulate above the middle, bright-green, quite glabrous, almost fleshy, veins inconspicuous. Flowers in axillary fascicles of 2–6,

small, about ½ in. diam., white spotted with purple; peduncles ⅓–⅔ in. long. Calyx-segments lanceolate, acuminate. Corolla campanulate; lobes rounded, villous within. Stamens 4, scarcely exserted. Ovary 4-celled. Drupe ¼–⅓ in. long, oblong, succulent, reddish-purple.—*A. Rich. Fl. Nouv. Zel.* (1832) 195; *A. Cunn. Precur.* (1838) n. 387; *Raoul Choix* (1846) 43; *Hook. f. Fl. Nov. Zel.* i (1853) 204; *Handb. N.Z. Fl.* (1864) 225; *T. Kirk Forest Fl.* (1889) t. 124; *Cheesem. Man. N.Z. Fl.* (1906) 563. Citharexylum perforatum *Forst. f. Prodr.* (1786) 44.

Kermadec Islands, North and South Islands, Chatham Islands: Not uncommon in lowland districts as far south as Otago, chiefly near the coast. *Ngaio.* October–January.

The wood is said to be durable, and is sometimes used for cabinetwork; and an infusion of the leaves has been used as a wash to prevent the bites of mosquitoes.

see Pilger Pflr. 102 (IV. 269) 1937

Family XCVII. **PLANTAGINACEAE.**

Perennial or annual usually stemless herbs. Leaves generally radical, tufted or spreading, simple, flat, nerved. Flowers regular, hermaphrodite or rarely unisexual, often dimorphic, generally in spikes terminating naked axillary scapes. Calyx inferior, persistent, deeply 4-partite, imbricate. Corolla gamopetalous, hypogynous, scarious; tube cylindric; limb with 4 spreading lobes with incurved margins. Stamens 4, rarely fewer, inserted on the tube of the corolla and alternate with its lobes; filaments usually long, capillary, exserted; anthers large, versatile. Ovary superior, 2–4-celled; style filiform, with two lines of stigmatic papillae; ovules few or many affixed to the septum, or solitary and basal in each cell. Fruit a 1–4-celled capsule with transverse dehiscence. Seeds usually peltate; albumen fleshy; embryo cylindric, radicle inferior.

A small and very distinct family, widely spread over the globe, but most abundant in temperate regions. Genera 3; species variously estimated, from 100 to over 200. The properties of the family are unimportant, and the species are mostly of unattractive appearance.

Pilger Pflanzenr. 102(IV) 269; 1937. **PLANTAGO** Linn. 1735

Annual or perennial herbs. Leaves all radical and rosulate, or rarely (in species not found in New Zealand) cauline and opposite or alternate. Scapes from the axils of the leaves, bearing at the top a few- or many-flowered spike of small greenish flowers. Flowers hermaphrodite, often dimorphic. Calyx-segments subequal. Corolla scarious, persistent, 4-lobed. Stamens 4, inserted on the tube of the corolla at or above the middle. Ovary 2-celled or spuriously 3–4-celled; ovules 1 to many in each cell. Capsule membranous, 2-celled or by abortion 1-celled, dehiscence circumscissile. Seeds laterally attached.

The genus includes the whole family except the monotypic genera *Littorella* and *Bougeria*, and has a world-wide distribution. With the exception of *P. Brownii*, which extends to Australia, all the New Zealand species are endemic. Several species from the Northern Hemisphere have become naturalized, the most abundant being *P. major* Linn and *P. lanceolata* Linn.

* Scapes many-flowered.

Leaves 2–4 in., ovate or obovate. Spikes 2–6 in. Capsule 2-seeded	1. *P. aucklandica.*
Leaves 2–10 in., lanceolate. Spikes ⅓–1 in. Bracts and calyx-segments glabrous. Capsule 4-seeded	2. *P. Raoulii.*
Leaves 1–5 in., oblong-lanceolate. Spikes ¼–1 in. Bracts and calyx-segments pilose and ciliate	3. *P. spathulata.*

** Scapes few-flowered. Plants small; leaves ¼–2 in. long.

PLANTAGO: Pilger: Pflr. 102 (iv.269) 1937.

1. Sepala perparva 1 mm. longa, spica ad florum unicum reducta.- Sed. Microcalyx 2
Sepala mujora, spica fere semper pluriflorae 3
2. Folia lanceolata v. latelanceolata v. et linearia vel anguste linearia, corollae lobi rarius 4 plerunque 3, semina usque ad 50. . . . . triandra
Folia ovato - v. oblongo-spathulata v. lanceolato spathulata, corollae lobi et stamina semper 4, capsula minor globosa, semina 10-20 . . . . . masonae
3. (a) Ovula 5, loculo 3-ovulato pariete spurio transversali quasi pipartito, semine superior pardo fere transversali, Sed. Mesembrania . . . . . Raoulii
(b) Ovula 2-4-7; carinae bracteae et sepalorum plerunque in laminae laterales transiens, lobi corollae angustiores parum reflexi, spica elongata - Sed. Palaeopsyllium . Aucklandica
(c) Ovula 4 v. plura. Species parvae, spicae pedunculus brevis v. perbrevis, spica pauciflora usque ad florem unicum reducta. S. oliganthos 4
4. Ovula 4 5
Ovula plura 6
5. Folia late spathulata . . . . . spathulata
Folia lanceolata v. elliptico-lanceolata . . . . . picta
6. Folia glabra v. paree pilosa, pilis paucicellulatis, cellulis angustis, ovula 6–8 . . . . . triantha
Folia + copiose pilosa, pilis multicellulatis, cellulis plerumque non multum longioribus quam latis, ovula ad 14 . . . . . lanigera

P. triantha
var. uniflora (Hook.f.) Pilger, nov.comb.

P. lanigera
var. petriei Cheesem.

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** Scapes few-flowered. Plants small; leaves ¼–2 in. long.

Leaves oblong-lanceolate, glabrous or sparsely pilose. Scape 1–8-flowered. Calyx-segments obtuse, glabrous. Capsule 8-seeded..	4. *P. Brownii.*
Leaves oblong-spathulate, densely clothed with tortuous woolly hairs. Scape 1–5-flowered. Calyx-segments subacute. Capsule 12–15-seeded	5. *P. lanigera.*
Leaves linear or lanceolate, densely villous at the base. Scape 1-flowered. Calyx-segments very minute, obtuse. Corolla-lobes and stamens often 3. Capsule 20–30-seeded	6. *P. triandra.*
Leaves thick and fleshy, ovate-spathulate to lanceolate-spathulate. Scape 1-flowered. Corolla-lobes and stamens 4. Capsule 10–20-seeded	7. *P. Masonae.*
Leaves linear-lanceolate, villous at the base. Scape 1-flowered. Calyx-segments acute, more than ½ as long as the capsule ..	8. *P. uniflora.*

1. **P. aucklandica** *Hook. f. Fl. Antarct.* i (1844) 64, t. 42.—Rhizome stout, often as thick as the thumb, 3–4 in. long, sometimes elongated above the ground, rarely branched at the top. Leaves all radical, densely crowded, 2–4 in. long, elliptic-obovate to obovate-lanceolate, obtuse or subacute, gradually narrowed into a short broad petiole, glabrous, fleshy, 7–10-nerved, remotely and obscurely sinuate-dentate; petioles villous at the very base with long soft brown hairs. Scapes numerous, stout, pilose or pubescent, much longer than the leaves. Spikes 2–6 in. long; flowers small, sessile, densely packed above the middle of the spike, laxly placed towards the base. Bracts broadly ovate, obtuse, concave, glabrous, rather shorter than the calyx; corolla-lobes elliptic-oblong, acute, patent or reflexed. Capsule ovoid, about twice as long as the calyx, 8-seeded. *Hook. f. Fl. N.Z. Fl.*

P. aucklandica Hook.f. Fl. Antarct. 1 (1844) 64, T. 42.

P. spathulata Hook.f. Fl. N.Z. (1853) 208.

P. picta Col. Trans. N.Z. Instit. XXII, 188 (1890) 481.

P. lanigera Hook.f. Handbk. Fl. N.Z. (1864) 227.
var. petriei Cheesem. Man. N.Z. Fl. (1906) 572.

P. triantha Spreng. Syst. Veg. 1 (1825) 439. P. brownii Rap. (1827) 484
var. uniflora (Hook.f.) Pilger. Pflanzenreich 102 (iv.269) (1937) 120.

P. triandra Berggr. Minn. Fisiog. Sallsk. Lund VIII. 1. (1877) 16.7.IV.

P. masonae Cheesem. Trans. N.Z. Inst. LIII (1921) 424.

P. raoulii Decne. D.C. Prodr. XIII. 1. (1852) 03.

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** Scapes few-flowered. Plants small; leaves ¼–2 in. long.

Leaves oblong-lanceolate, glabrous or sparsely pilose. Scape 1–8-flowered. Calyx-segments obtuse, glabrous. Capsule 8-seeded..	4. *P. Brownii.*
Leaves oblong-spathulate, densely clothed with tortuous woolly hairs. Scape 1–5-flowered. Calyx-segments subacute. Capsule 12–15-seeded	5. *P. lanigera.*
Leaves linear or lanceolate, densely villous at the base. Scape 1-flowered. Calyx-segments very minute, obtuse. Corolla-lobes and stamens often 3. Capsule 20–30-seeded	6. *P. triandra.*
Leaves thick and fleshy, ovate-spathulate to lanceolate-spathulate. Scape 1-flowered. Corolla-lobes and stamens 4. Capsule 10–20-seeded	7. *P. Masonae.*
Leaves linear-lanceolate, villous at the base. Scape 1-flowered. Calyx-segments acute, more than ½ as long as the capsule ..	8. *P. uniflora.*

1. **P. aucklandica** *Hook. f. Fl. Antarct.* i (1844) 64, t. 42.—Rhizome stout, often as thick as the thumb, 3–4 in. long, sometimes elongated above the ground, rarely branched at the top. Leaves all radical, densely crowded, 2–4 in. long, elliptic-obovate to obovate-lanceolate, obtuse or subacute, gradually narrowed into a short broad petiole, glabrous, fleshy, 7–10-nerved, remotely and obscurely sinuate-dentate; petioles villous at the very base with long soft brown hairs. Scapes numerous, stout, pilose or pubescent, much longer than the leaves. Spikes 2–6 in. long; flowers small, sessile, densely packed above the middle of the spike, laxly placed towards the base. Bracts broadly ovate, obtuse, concave, glabrous, rather shorter than the calyx; corolla-lobes elliptic-oblong, acute, patent or reflexed. Capsule ovoid, about twice as long as the calyx, 2-seeded.—*Handb. N.Z. Fl.* (1864) 228.

Auckland Islands: Not uncommon on the hills, alt. 1000 ft., *Sir J. D. Hooker, T. Kirk! F. R. Chapman! B. C. Aston! J. S. Tennant!*

A very distinct species, with something of the habit of the European *P. media* Linn. Sir J. D. Hooker says that it is remarkable for its numerous leaves, which are generally quite smooth and fleshy, often forming a dense head, not unlike that of a small cabbage. In the smoothness, thick and succulent habit, and stout column it bears some affinity to the caulescent species of Juan Fernandez and other insular situations.

2. **P. Raoulii** *Decne. in DC. Prodr.* xiii, i (1852) 703.—Rootstock short, stout. Leaves numerous, all radical, erect or rosulate, 2–10 in. long, oblong-lanceolate to linear-lanceolate, subacute, narrowed into a rather long broad petiole, irregularly sinuate-toothed or quite entire, 3–5-nerved, more or less pilose or almost hispid; petioles villous at the base with long brown silky hairs. Scapes longer than the leaves, few or many, slender, strict, pilose, terminating in a rather dense spike ⅓–1 in. long. Bracts orbicular, obtuse, glabrous, broadly margined. Calyx-segments broadly ovate, with a thick fleshy keel and broad membranous margins, glabrous. Corolla-tube about as long as the calyx, lobes very small. Capsule twice as long as the calyx, conic, acute; seeds usually 4.—*Hook. f. Fl. Nov. Zel.* i (1853) 208; *Handb. N.Z. Fl.* (1864) 228; *Cheesem. Man. N.Z. Fl.* (1906) 507; *Ill. N.Z. Fl.* ii (1914) t. 163. P. varia *A. Cunn. Precur.* (1838) n. 370 (*not of R. Br.*); *Raoul Choix* (1846) 44. P. dasyphylla *Col. in Trans. N.Z. Inst.* xxiv (1892) 393.

North and South Islands, Stewart Island: Common throughout, on most banks, &c. Sea-level to 3500 ft. Flowers throughout the spring and summer.

Very closely allied to the Australian *P. varia*, which has become sparingly naturalized in the Dominion, but the spike is shorter and more glabrous, and the flowers are smaller.

3. **P. spathulata** *Hook. f. Fl. Nov. Zel.* i (1853) 208.—Rootstock short, stout. Leaves numerous, all radical, spreading, rosulate, very variable in size and shape, 1–5 in. long, obovate-spathulate to oblong-spathulate or lanceolate-spathulate, obtuse or subacute, narrowed into rather long broad petioles, rather thick and fleshy, entire or more usually irregularly sinuate-toothed, sometimes almost pinnatifid, sparingly pilose or almost glabrate; petioles villous at the base. Scapes usually numerous, longer than the leaves, slender, villous or pilose; spike oblong, obtuse, densely many-flowered, ¼–1 in. long. Bracts and calyx-segments broadly ovate, acute, with a thick fleshy centre, pilose and ciliate. Corolla-lobes ovate, acute. Capsule not much longer than the calyx, broadly oblong, apiculate. Seeds 3 or 4.—*Handb. N.Z. Fl.* (1864) 571; *Cheesem. Man. N.Z. Fl.* (1906) 571.

North Island: East Cape district, *Bishop Williams, Adams* and *Petrie!* Hawke's Bay and coast between Castlepoint and Cape Palliser, *Colenso!* South Island: Not uncommon throughout, especially on the eastern side of the Southern Alps. Sea-level to 3500 ft.

Easily distinguished from *P. Raoulii* by the shorter and broader more rosulate leaves, shorter scapes, pilose and ciliate bracts and calyx-segments, and shorter and broader capsule.

4. **P. Brownii** *Rapin in Mem. Soc. Linn. Par.* vi (1827) 485.—Small, tufted, rather fleshy. Rhizome short, stout, woolly amongst the leaves or quite glabrous. Leaves very numerous, all radical, spreading, rosulate, ½–2 in. long, oblong-lanceolate or spathulate, acute or obtuse, narrowed into a broad petiole, more or less sinuate-toothed or entire, rather thick and fleshy, glabrous or pilose with scattered jointed hairs. Scapes many, variable in length, equalling the leaves or much longer than them, pilose or glabrous. Flowers small, usually from 2 to 5, but in depauperated specimens the spike is often reduced to a single flower, and in large specimens the flowers may be as many as 6–8. Bracts and calyx-segments broadly ovate, concave, obtuse or subacute, glabrous or sparingly pilose, keel thick, fleshy, margins scarious. Corolla-tube equalling the calyx, lobes ovate, acute, spreading or deflexed. Capsule small, ovoid, exceeding the calyx, 2-celled. Seeds usually 4 in each cell.—*Hook. f. Handb. N.Z. Fl.* (1864) 227; *Benth. Fl. Austral.* v (1870) 141; *Cheesem. Man. N.Z. Fl.* (1906) 572. P. carnosa *R. Br. Prodr.* (1810) 425 (*not of Lam.*); *Hook. f. Fl. Antarct.* i (1844) 65, t. 43; *Fl. Nov. Zel.* i (1853) 207. P. picta *Col. in Trans. N.Z. Inst.* xxii (1890) 481.

North Island: Mount Hikurangi, *Adams* and *Petrie!* Mount Egmont, *Buchanan! T. F. C.;* Ruahine Mountains, *Colenso, B. C. Aston!* Tararua Mountains, *W. Townson! B. C. Aston!* Mount Hector, *Petrie!* South Island, Stewart Island: Not uncommon in mountain districts. Auckland and Campbell Islands: Abundant on rocks near the sea. Sea-level to 5500 ft.

Also in Victoria and Tasmania. The Auckland Islands plant is almost glabrous, and has much more fleshy and more deeply toothed leaves, and the spikes are usually larger. In my memoir on "The Systematic Botany of the Islands to the South of New Zealand" (p. 426) I expressed the opinion that it should constitute a distinct species, but since then I have seen specimens quite intermediate in character.

5. **P. lanigera** *Hook. f. Handb. N.Z. Fl.* (1864) 227.—A small depressed species. Rootstock short, stout. Leaves numerous, all radical, spreading, forming flat rosettes 1–2 in. across, ⅓–1 in. long, oblong-spathulate, obtuse

or subacute, narrowed into a broad flat petiole, entire or obscurely sinuate-dentate, rather thick and fleshy, upper surface densely woolly with dirty white tortuous jointed hairs, under-surface woolly or almost glabrous. Scapes numerous, erect or inclined, at first much shorter than the leaves, but elongating as the fruit ripens, stout, densely tomentose. Spike short, 1–5-flowered; flowers small, crowded. Bracts and calyx-segments broadly ovate, subacute, glabrous, keel dark, thick and fleshy. Corolla-tube equalling the calyx; lobes ovate-lanceolate, acute. Capsule exceeding the calyx, broadly oblong, obtuse, 2-celled. Seeds 6 or 7 in each cell.—*Cheesem. Man. N.Z. Fl.* (1906) 572.

Var. **Petriei**.—Larger; leaves often 2 in. long, thinner, upper surface sparingly pilose with jointed hairs, glabrous or nearly so beneath, margins ciliate. Scapes longer, usually exceeding the leaves. Perhaps a distinct species.

South Island: Nelson—Mountains above the Clarence Valley, *T. F. C.;* Lake Tennyson, *R. M. Laing.* Canterbury—*J. B. Armstrong.* Otago—Lake district, *Hector* and *Buchanan!* Old Man Range, Hector Mountains, Mount Pisa, Mount Cardrona, *Petrie!* 4000–6000 ft. Var. *Petriei:* Mount Kyeburn, alt. 3500 ft., *Petrie!*

The ordinary state of the species is easily recognized by the copious matted jointed hairs on the leaves, short densely tomentose scapes, and oblong obtuse many-seeded capsule.

6. **P. triandra** *Berggr. in Minneskr. Fisiog. Sallsk. Lund.* (1877) 16, t. 4, f. 12–33.—Rootstock short, stout, crown densely clothed with long red-brown silky wool, rarely almost glabrous. Leaves numerous, all radical, spreading, forming flat rosettes 1–3 in. across, ½–2 in. long, linear or lanceolate, acute, narrowed into broad flat petioles, entire or more usually sinuate-dentate or pinnatifid, rather thick or almost membranous, more or less pubescent with jointed hairs on the upper surface, the hairs sometimes arranged in transverse bands across the leaf, under-surface usually glabrous. Scapes very short in the flowering stage, concealed amongst the wool at the base of the leaves, often but not always elongating in fruit and attaining ½ the length of the leaves or even more, 1- or very rarely 2-flowered. Bract minute, ovate, obtuse. Calyx-segments 3–4, ovate, obtuse, very small, many times less than the ovary. Corolla-tube elongated, twice the length of the ovary; limb with 3–4 linear-oblong acute lobes. Stamens usually 3, sometimes 4. Capsule oblong, obtuse. Seeds numerous, angled, 20–30.—*Cheesem. Man. N.Z. Fl.* (1906) 573. P. Hamiltoni *T. Kirk in Trans. N.Z. Inst.* xi (1879) 465.

South Island, Stewart Island: Margins of lakes and wet ground from Westport and Marlborough southwards, not uncommon. Sea-level to 3500 ft.

A very curious little plant. It varies considerably in the amount of the silky wool at the base of the leaves, and in the hairiness of the leaves themselves, lowland specimens being often nearly glabrous. The length of the fruiting-scape is a very uncertain character; on the same plant it may either elongate or remain unaltered.

7. **P. Masonae** *Cheesem. in Trans. N.Z. Inst.* liii (1921) 424.—Rootstock short, stout, putting down numerous thick and fleshy rootlets. Leaves many, all radical, spreading, the outer closely appressed to the surface of the ground, thus forming rosettes ½–2½ in. diam., very thick and fleshy, greenish blotched with purple, ½–1½ in. long, rarely more, ovate- or oblong-spathulate to lanceolate-spathulate, suddenly narrowed into a broad flat petiole of variable length, towards the apex gradually narrowed

into a blunt fleshy or almost callous point; margins, with the exception of the triangular tip, regularly and almost pinnatifidly divided into numerous shallow blunt fleshy or callous lobes; upper surface furnished with short whitish jointed hairs that are usually arranged in transverse bands; under-surface glabrous or nearly so; base of the leaf usually furnished with longer brownish tortuous hairs, but sometimes almost glabrous. Flowers minute, solitary in the axils of the leaves; peduncles wanting or nearly so, apparently not elongating in fruit. Bract ovate, minute. Calyx-segments 4, ovate, obtuse. Corolla-tube three times the length of the calyx in the flowering period; limb 4-lobed, lobes oblong, obtuse. Stamens invariably 4 in all the numerous flowers examined. Capsule globose; seeds numerous, 10–20.

North Island: Sea-cliffs at Manaia, Taranaki, often in localities well washed with sea-spray, *Mrs. F. Mason!*

This is evidently a close ally of *P. triandra* Berggren, but differs in the more robust habit, very fleshy and proportionately much broader leaves with obtuse callous tips, more minute sessile flowers the peduncles of which apparently do not lengthen in fruit, in the stamens being always 4, and in the smaller capsules. I have pleasure in associating the plant with the name of its discoverer, to whom I am much indebted for information respecting the vegetation of south-western Taranaki.

8. **P. uniflora** *Hook. f. Fl. Nov. Zel.* i (1853) 207.—A small tufted species, often forming extensive patches; root stout, much branched; rootlets fibrous, descending. Stems short, stout, villous at the top with long tawny hairs. Leaves all radical, few, ½–1½ in. long, linear-lanceolate or oblong-lanceolate, sinuate-toothed or quite entire, acute or acuminate, gradually narrowed into a long and slender base, glabrous except at the villous base; midrib evident, veins faintly reticulated. Flowers solitary, in young flowers sessile or nearly so, but the scape gradually lengthens as the capsule ripens, ultimately becoming as long as or longer than the leaves, and usually sparingly clothed with long slender hairs. Sepals 4, linear-oblong, acute. Corolla-lobes narrow linear-oblong. Capsule $\frac{1}{10}$ in. long, broadly oblong, obtuse.—*Handb. N.Z. Fl.* (1864) 227; *Cheesem. Man. N.Z. Fl.* (1906) 573.

North Island: Summit of the Ruahine Mountains, *Colenso, B. C. Aston!* Kaimanawa Mountains, *B. C. Aston!* Tararua Mountains, *W. Townson! Petrie! B. C. Aston!* Mount Hector, *Petrie!* 3500–5000 ft. December–February.

Closely allied to *P. triandra*, but the habit is entirely different, the leaves narrower, the flowers always solitary, and the scapes, when mature, very long and slender, and clothed with long slender hairs.

Family XCVIII. **RUBIACEAE.**

Trees, shrubs, or herbs, rarely climbing. Leaves opposite or whorled, simple, entire or very rarely toothed or lobed. Stipules always present, usually interpetiolar, either free or united with the petioles into a sheath, or connate into a sheath or ring surrounding the stem within the petioles; in the tribe *Galieae* resembling the leaves, and with them forming a whorl round the branch. Flowers regular, hermaphrodite or unisexual, variously arranged. Calyx-tube adnate to the ovary; limb 4–5-toothed or cupular, sometimes wanting. Corolla gamopetalous, tubular, funnel-shaped, cam-

panulate, or rotate, usually 4–5-lobed; lobes valvate or imbricate or contorted. Stamens inserted on the tube or mouth of the corolla, equal in number to its lobes. Ovary inferior, 2–many-celled, crowned by a fleshy disc; styles 1 or 2 or more; ovules solitary or 2 or more in each cell. Fruit very various, a drupe or berry or capsule, or composed of dehiscent or indehiscent cocci. Seeds with fleshy or horny albumen; embryo straight or curved; radicle superior or inferior.

One of the largest and best-defined families in the vegetable kingdom, containing more than 350 genera and 5500 species. With the exception of the tribe *Galieae*, which is almost entirely temperate, the species are mainly tropical or subtropical, and are especially plentiful in the warmer portions of South America. The medicinal properties of the family are most important. Out of many excellent drugs yielded by it, quinine and ipecacuanha are the best known and the most valuable. Among the species used for food the most noteworthy is the coffee-plant, which is now cultivated in all warm countries, and is of immense commercial importance. Many ornamental plants belong to the family, the various kinds of *Bouvardia, Gardenia, Ixora*, &c., being well-known examples. Of the 4 New Zealand genera, *Coprosma* extends to Australia and Tasmania, the Pacific islands, New Guinea, and the mountains of Borneo. *Nertera* has the same distribution, and is found in South America as well. The two remaining genera are widely distributed in the North Temperate Zone.

* Leaves opposite; stipules interpetiolar. Ovary 2-celled; ovules solitary in each cell. Fruit a drupe.

Shrubs or small trees. Flowers unisexual .. .. .. 1. COPROSMA.
Slender herbs. Flowers hermaphrodite .. .. .. 2. NERTERA.

** Leaves whorled; stipules apparently wanting. (In reality the whorl consists of two opposite leaves and several leaf-like stipules.) Ovary 2-celled; ovules solitary in each cell. Fruit of 2 dry indehiscent cocci. Herbs.

Calyx-limb wanting. Corolla rotate .. .. .. 3. GALIUM.
Calyx-limb wanting. Corolla funnel-shaped or campanulate .. 4. ASPERULA.

See W.R.B. Oliver B.P. Bishop Thes. Bull. 132:1935
Genus Coprosma

1. COPROSMA Forst. 1776.

Shrubs or small trees, usually erect, more rarely prostrate or creeping, often foetid when bruised. Leaves opposite, petiolate or almost sessile; stipules interpetiolar, acute or acuminate, entire or denticulate. Flowers dioecious, small and inconspicuous, solitary or clustered in few- or many-flowered fascicles or cymes. Calyx-limb 4–5-toothed or -lobed or almost truncate, often absent in the males. Corolla funnel-shaped or campanulate, 4–5-lobed or -partite; lobes valvate in the bud. Stamens usually 4 or 5, inserted at the base of the corolla-tube; filaments long, filiform; anthers exserted, pendulous. Ovary 2-celled, rarely 3- or 4-celled; styles the same number as the cells, free to the base, filiform, far-exserted, papillose-hirsute; ovules solitary in each cell. Fruit a fleshy oblong or ovoid or globose drupe, with 2 (rarely 4) 1-seeded plano-convex pyrenes.

A genus of about 70 species, having its headquarters in New Zealand; found also in Australia and Tasmania and northwards to New Guinea and Borneo; also stretching through Polynesia as far as the Sandwich Islands and Juan Fernandez. In New Zealand it everywhere forms a large proportion of the shrubby vegetation, and it is equally plentiful in lowland forests or subalpine woods, often forming dense and sometimes almost impenetrable thickets. One species ascends the mountains to a height of 6000 ft., and reaches as far south as Macquarie Island, where it is the sole ligneous plant. The species are extremely variable in habit, foliage, and vegetative characters generally; and, as the flowers are small and inconspicuous and very uniform in structure throughout the genus, it is no easy matter to obtain good distinctive characters, even when dealing with fresh specimens. In the following

account I have adhered to the plan adopted in my monograph of the New Zealand species, published in the "Transactions of the New Zealand Institute" (vol. xix (1887) 218 to 252), to which reference should be made for many details which cannot be given here.

In attempting to determine the species of *Coprosma* really good and well-selected specimens showing both foliage and flowers are indispensable. Both sexes should be collected; and, as important characters are often afforded by the fruit, it should be obtained also, if possible from the same plant from which the female flowers were taken, notes being preserved of the shape, size, colour, and other characters lost in drying. Notes should also be kept of the habit and mode of growth, some of the closely allied species being easily distinguished by that alone. As the characters on which the species are founded are to a great extent comparative, the student must not expect to make much progress until he has collected a considerable number of the species and carefully compared one with another. The small-leaved species included in section B are particularly difficult to identify until most of them have been studied in detail.

In many of the small-leaved species the flowers are closely invested by one or more series of connate bracts, each series being composed of a pair of minute depauperated leaves and their stipules. The upper series usually forms an unequally 4-toothed cup-shaped involucel, and is easily mistaken for a calyx, especially in the male flowers, where the true calyx is often entirely wanting.

It is perhaps necessary to state that, with one or two exceptions, I have examined authentic specimens in Mr. Colenso's herbarium of the 16 species described by him in various volumes of the "Transactions of the New Zealand Institute." They are for the most part absolutely identical with previously described species, and the remainder differ so very slightly that they cannot be separated even as varieties.

A. *Erect shrubs or trees. Leaves large, over 1 in. in length. Flowers fascicled on lateral peduncles; fascicles usually many-flowered.*

* Peduncles 1–3 in. long (short in *C. macrocarpa*), trichotomously divided; fascicles dense.

Leaves 3–7 in. long, coriaceous. Peduncles 1–1½ in. Fruit very large, ½–¾ in. long	1. *C. macrocarpa.*
Leaves 4–9 in., membranous. Peduncles 1–3 in. Fruit ⅓ in. ..	2. *C. grandifolia.*
Leaves 2–5 in., coriaceous. Peduncles 1–2 in. Fruit ⅓ in. ..	3. *C. lucida.*

** Peduncles short, seldom over 1 in. Fascicles dense, many-flowered, rarely few-flowered.

Subalpine dwarf shrub. Leaves very coriaceous, serrulate. Fascicles small, 2–5-flowered	4. *C. serrulata.*
Maritime shrub. Branchlets glabrous or nearly so. Leaves fleshy, bright-green; margins recurved	5. *C. Baueri.*
Tree 15–40 ft. Branchlets coarsely pubescent. Leaves 1½–3 in., oblong or obovate	6. *C. chathamica.*
Maritime shrub. Branchlets finely pubescent. Leaves 1–2 in., subcoriaceous, oblong, obtuse; margins flat	7. *C. petiolata.*
Leaves 2–5 in., elliptic-oblong, acute, firm, coriaceous. Drupe orange	8. *C. robusta.*
Leaves 1½–2 in., linear or lanceolate, coriaceous. Drupe pale, and translucent	9. *C. Cunninghamii.*
Leaves 1½–3 in., ovate-lanceolate to elliptic-ovate, acuminate, membranous, glabrous. Inflorescence lax	10. *C. acutifolia.*
Leaves 1½–4 in., ovate-lanceolate to ovate, acuminate, membranous; petioles and midribs hairy. Inflorescence dense ..	11. *C. tenuifolia.*
Tree 15–30 ft. Leaves ovate- or orbicular-spathulate, narrowed into winged petioles	12. *C. arborea.*

B. *Erect or rarely prostrate shrubs. Leaves small, less than 1 in. Flowers solitary or in few-flowered fascicles on minute arrested branchlets, which are often so much reduced that the flowers appear to be axillary.*

* Twigs glabrate or puberulous. Leaves spathulate. Drupe globose, black.

Leaves suddenly contracted into a narrow winged petiole longer than the blade	13. *C. spathulata.*

** Twigs densely pubescent (except in *C. tenuicaulis*). Leaves orbicular, orbicular-spathulate, or broadly oblong (often narrow in *C. rhamnoides*). Drupe globose, black or red.

Branches divaricating. Leaves $\frac{1}{3}$–1 in., orbicular, cuspidate, membranous. Drupe often didymous, $\frac{1}{6}$ in. diam., red .. 14. *C. rotundifolia.*
Branches fastigiate. Leaves $\frac{1}{3}$–$\frac{2}{3}$ in., orbicular-spathulate, acute, membranous. Drupe $\frac{1}{6}$ in. diam., black or nearly so .. 15. *C. areolata.*
Branches spreading. Leaves $\frac{1}{4}$–$\frac{1}{2}$ in., orbicular-spathulate, obtuse, rather coriaceous. Drupe $\frac{1}{3}$ in. diam., black .. .. 16. *C. tenuicaulis.*
Branches spreading, often interlaced. Leaves $\frac{1}{4}$–$\frac{3}{4}$ in., variable, orbicular to ovate-oblong or linear-oblong. Drupe $\frac{1}{6}$ in. diam., red .. .. 17. *C. rhamnoides.*
Stem prostrate. Branchlets and petioles densely pubescent. Leaves thick and fleshy. Drupe oblong .. .. .. 18. *C. neglecta.*

*** Twigs densely pubescent (except in *C. ramulosa*). Leaves oblong, linear-oblong, or linear-obovate. Drupe globose.

Leaves $\frac{1}{4}$–$\frac{2}{3}$ in., oblong to obovate, densely ciliate .. .. 19. *C. ciliata.*
Erect, leafy. Leaves $\frac{1}{4}$–$\frac{2}{3}$ in., obovate or linear-obovate. Drupe $\frac{1}{3}$ in. diam., bluish or bluish-violet to black .. .. 20. *C. parviflora.*
Prostrate or decumbent, glabrate. Leaves $\frac{1}{3}$ in., linear-obovate. Drupe $\frac{1}{6}$ in. diam., red .. .. 21. *C. ramulosa.*

**** Twigs nearly glabrous. Leaves orbicular to oblong or obovate (spathulate in *C. virescens*). Drupe oblong, rarely obovoid, usually yellow.

Branches ascending, puberulous. Leaves $\frac{1}{2}$–1 in. long, obovate or oblong-ovate, coriaceous .. .. 22. *C. Buchanani.*
Branches divaricating. Leaves broadly oblong or orbicular. Veins in large areoles. Drupe dark-red, $\frac{1}{3}$ in. diam., didymous 23. *C. Wallii.*
Branches rigid and interlacing. Leaves $\frac{1}{3}$–$\frac{2}{3}$ in., orbicular or broad-oblong, very coriaceous. Drupe $\frac{1}{4}$ in. long, broadly oblong .. .. 24. *C. crassifolia.*
Branches spreading, often interlaced. Leaves $\frac{1}{4}$–$\frac{3}{4}$ in., obovate or oblong-spathulate, subcoriaceous. Drupe $\frac{1}{4}$–$\frac{1}{3}$ in., oblong or obovoid .. .. 25. *C. rigida.*
Branches spreading, interlaced. Leaves $\frac{1}{8}$–$\frac{1}{4}$ in., oblong or linear-oblong, coriaceous. Drupe $\frac{1}{3}$ in. diam., obconic or obcordate .. 26. *C. obconica.*
Branches spreading. Leaves $\frac{1}{4}$–$\frac{3}{4}$ in., orbicular or broadly oblong, membranous. Drupe $\frac{1}{4}$ in. long, yellowish-white .. .. 27. *C. rubra.*
Branches slender, interlacing. Leaves $\frac{1}{2}$–$\frac{1}{3}$ in., ovate-spathulate, thin. Drupe $\frac{1}{4}$ in. long, yellowish-white .. .. .. 28. *C. virescens.*

***** Twigs pubescent or puberulous. Leaves linear or narrow linear-oblong. Drupe variable.

Prostrate; branches flexuous and interlacing. Leaves narrow-linear, $\frac{1}{4}$–$\frac{1}{3}$ in. long, $\frac{1}{20}$ in. wide. Drupe globose, pale-blue .. 29. *C. acerosa.*
Smaller, darker, and more rigid than the preceding. Branches fewer, shorter, and stouter. Leaves more distant, shorter and more coriaceous .. .. 30. *C. brunnea.*
Rigid erect shrub 4–10 ft. high. Leaves $\frac{1}{4}$–$\frac{3}{4}$ in. long, $\frac{1}{25}$ in. broad, often long-petioled. Drupe oblong .. .. .. 31. *C. rugosa.*
Tall, erect; branches spreading. Leaves $\frac{1}{4}$–$\frac{1}{2}$ in. long, linear or linear-oblong. Drupe oblong, $\frac{1}{3}$ in. long, bluish .. .. 32. *C. propinqua.*
Procumbent or suberect. Leaves usually fascicled, $\frac{1}{2}$–1 in. long, linear, linear-oblong, or linear-obovate .. .. .. 33. *C. Kirkii.*

C. Erect or rarely prostrate shrubs. Leaves small, less then 1 in. long (except in C. foetidissima *and occasionally in* C. linariifolia). *Flowers terminating leafy branchlets, always solitary (except the males in* C. linariifolia *and sometimes in* C. foetidissima).

Erect, slender, glabrate, 6–15 ft. Leaves $\frac{1}{2}$–$1\frac{1}{2}$ in., linear-lanceolate; stipules long, sheathing. Male flowers in 3–5-flowered fascicles .. .. 34. *C. linariifolia.*
Erect; branches stout, setose. Leaves $\frac{1}{3}$ in., linear-lanceolate, ciliate .. .. 35. *C. Solandri.*

Erect, slender, 6–15 ft., intensely foetid when bruised. Leaves ½–2 in., oblong or obovate, membranous. Male flowers sometimes fascicled .. .. 36. *C. foetidissima.*
Erect or procumbent, 2–8 ft., not foetid. Leaves ⅓–1 in., linear-obovate or linear-oblong. Flowers solitary on decurved peduncles .. .. 37. *C. Colensoi.*
Branches spreading, slender. Leaves ½–1 in. long, linear, obtuse or truncate, often curved. Flowers solitary on decurved peduncles .. .. 38. *C. Banksii.*
Prostrate, foetid when bruised. Leaves ¼–⅔ in., linear-obovate, retuse or emarginate, coriaceous; margins minutely crenulate 39. *C. retusa.*
Erect, rigid, densely branched. Leaves numerous, ⅕–¾ in., linear- or oblong-obovate, coriaceous, spreading or recurved .. 40. *C. cuneata.*
Erect; branches very slender. Leaves ¼–⅓ in., linear-lanceolate, flat, thin .. .. 41. *C. microcarpa.*
Prostrate or procumbent. Leaves ⅙–¼ in., linear-lanceolate, concave, coriaceous .. .. 42. *C. depressa.*

D. Stems short, prostrate and rooting, often densely matted. Leaves small. Flowers terminal, solitary.

Leaves glabrous, linear-oblong to rounded-oblong or obovate. Male corolla large, curved, tubular. Drupe ¼ in. diam. .. 43. *C. repens.*
Leaves hairy, linear-oblong or linear-obovate. Male corolla smaller, campanulate above. Drupe ⅓–½ in. diam. .. 44. *C. Petriei.*

1. **C. macrocarpa** *Cheesem. in Trans. N.Z. Inst.* xx (1888) 147.—A robust leafy glossy-green shrub 5–12 ft. high, quite glabrous in all its parts; bark greyish-brown. Leaves large, 3–7 in. long, 1½–3½ in. broad, ovate-oblong or elliptic-oblong, obtuse or acute or apiculate, rather suddenly narrowed into a short stout petiole, coriaceous; margins slightly thickened; veins conspicuous, reticulated. Stipules large, on the young leafy shoots often sheathing the branch for some distance. Flowers not seen. Fruit much the largest of the genus, in fascicles of 3–7 on very short axillary peduncles, ½–1 in. long, broadly ovoid or oblong or sometimes nearly orbicular; not seen perfectly ripe.—*T. Kirk Students' Fl.* (1899) 230; *Cheesem. Man. N.Z. Fl.* (1906) 246.

North Island: Hitherto only found on the Three Kings Islands, to the north-west of Cape Maria van Diemen, *T. F. C.*

At once distinguished by the large fruit, which is more than twice the size of that of *C. grandifolia*, which is its nearest ally. The leaves are almost as large as those of *C. grandifolia*, but approach *C. robusta* in shape and texture, and dry a brownish-black as in that species.

2. **C. grandifolia** *Hook. f. Fl. Nov. Zel.* i (1853) 104.—A large sparingly branched shrub 8–15 ft. high, with dark-brown bark. Leaves large, 4–9 in. long, obovate-oblong or elliptic-oblong, rarely narrower and elliptic-lanceolate, acute or acuminate, membranous, dull-green, not shining nor glossy; veins finely reticulated; petioles rather slender, ¾–1½ in. long. Peduncles 1–3 in. long, trichotomously divided. Flowers in fascicles at the ends of the divisions of the peduncle; male fascicles much more dense than the females. Calyx distinct in both sexes, minute, 4–5-toothed. Male corolla ⅓ in. long, funnel-shaped; female smaller, ⅕–¼ in., tubular. Drupe about ⅓ in. long, oblong, obtuse, reddish-orange.—*Handb. N.Z. Fl.* (1864) 112; *Cheesem. in Trans. N.Z. Inst.* xix (1887) 229; *T. Kirk Students' Fl.* (1899) 231; *Cheesem. Man. N.Z. Fl.* (1906) 246. C. autumnalis *Col. in Trans. N.Z. Inst.* xix (1887) 263.

NORTH AND SOUTH ISLANDS: Abundant from the Three Kings Islands and the North Cape to Marlborough and the south-west of Nelson Province. Sea-level to 2500 ft. *Kānono; Mānono.* April–June.

One of the most distinct species of the genus, easily recognized by the large membranous leaves and well-developed inflorescence.

3. **C. lucida** *Forst. f. Prodr.* (1786) 22.—A stout leafy glabrous shrub 4–15 ft. high. Leaves 2–5 in. long, obovate to oblong-obovate or obovate-lanceolate, obtuse or acute or apiculate, gradually narrowed into a short stout petiole, coriaceous, shining, yellow-green when dry. Peduncles 1–2 in. long, trichotomously divided. Flowers numerous, in fascicles at the ends of the divisions of the peduncle. Calyx present in both sexes, minutely 4–5-toothed. Male corolla $\frac{1}{5}$ in. long, broadly tubular; female shorter and narrower. Drupe $\frac{1}{3}$–$\frac{1}{2}$ in. long, oblong or oblong-obovoid, reddish-orange.—*A. Rich. Fl. Nouv. Zel.* (1832) 262; *A. Cunn. Precur.* (1838) n. 470; *Raoul Choix* (1846) 46; *Hook. f. Fl. Nov. Zel.* i (1853) 104; *Handb. N.Z. Fl.* (1864) 112; *Cheesem. in Trans. N.Z. Inst.* xix (1887) 230; *T. Kirk Students' Fl.* (1899) 231; *Cheesem. Man. N.Z. Fl.* (1906) 246; *Ill. N.Z. Fl.* i (1914) 79.

Var. **angustifolia** *Cheesem.*—Leaves much narrower, narrow linear-obovate, acute at the tip, long-attenuated towards the base.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Abundant throughout, ascending to 3500 ft. Var. *angustifolia:* Little Barrier Island, *T. F. C.;* Cape Colville Peninsula, from Moehau to Te Aroha, *T. Kirk! Adams! W. Townson! T. F. C.;* Mount Egmont, *T. F. C., Cockayne.* Sea-level to 3500 ft. September–November.

Allied to *C. grandifolia,* which it approaches in the inflorescence, but easily separated by the smaller coriaceous and glossy obovate leaves.

4. **C. serrulata** *Hook. f. ex Buch. in Trans. N.Z. Inst.* iii (1871) 212.—A robust perfectly glabrous dwarf shrub 1–4 ft. high; branches few, spreading; old bark white and papery. Leaves $\frac{3}{4}$–2 in. long or more, oblong-obovate or broadly obovate or nearly orbicular, rounded at the apex, obtuse or apiculate, narrowed into a short broad petiole, thick and coriaceous; margins thickened, minutely serrulate. Stipules very large, triangular, with toothed or ciliated margins. Male flowers in 3–7-flowered axillary fascicles. Calyx wanting. Corolla campanulate, 4–5-lobed. Females solitary or in 2–5-flowered fascicles. Calyx-limb obscurely toothed. Corolla tubular, shortly 3–5-lobed. Drupe $\frac{1}{4}$–$\frac{1}{3}$ in., broadly oblong, reddish.—*Cheesem. in Trans. N.Z. Inst.* xix (1887) 231; *T. Kirk Students' Fl.* (1899) 232; *Cheesem. Man. N.Z. Fl.* (1906) 247; *Ill. N.Z. Fl.* i (1914) t. 80.

SOUTH ISLAND: Subalpine localities from Mount Arthur, Nelson, to Dusky Bay and Preservation Inlet, chiefly on the western side of the mountains. Altitudinal range 2000–5000 ft. November–January.

Easily distinguished by the serrulate leaves, but it has other peculiarities of a marked character. The bark of the stems and old branches is loose, white and papery, and can be detached in flakes of considerable size. The stipules are unusually large, and often form swollen connate sheaths surrounding the branch, the mouth of sheath being toothed and ciliate. Although technically falling into the same group of species as *C. lucida* and *C. robusta,* it differs widely in habit and general appearance, and must be regarded as one of the most distinct members of the genus.

5. **C. Baueri** *Endl. Iconog.* (1838) t. 111.—A shrub or small tree, very variable in size and mode of growth; in exposed rocky places often not more than 1–3 ft. high, with almost prostrate branches; in rich sandy soils sometimes forming a round-topped tree 15–25 ft. high. Branches stout, glabrous, or the younger ones minutely pubescent. Leaves bright shining-green,

almost fleshy, black when dry, 1–3 in. long, broadly ovate or oblong, obtuse or retuse; margins usually recurved. Stipules short and broad, minutely toothed. Male flowers in dense heads on short axillary peduncles. Calyx minute, cupular, obsoletely 4-toothed. Corolla campanulate, $\frac{1}{4}$–$\frac{1}{5}$ in. long, 4–5-lobed. Females in 3–6-flowered heads; peduncles shorter and more slender than in the males. Calyx-limb minute, truncate or obscurely 4-toothed. Corolla tubular, shortly 4-lobed. Drupe ovoid, $\frac{1}{4}$–$\frac{1}{3}$ in. long, orange-yellow.—*Cheesem. Man. N.Z. Fl.* (1906) 247. C. Baueriana *Hook. f. Fl. Nov. Zel.* i (1853) 104; *Handb. N.Z. Fl.* (1864) 112; *Cheesem. in Trans. N.Z. Inst.* xix (1887) 232; *T. Kirk Forest Fl.* (1889) t. 62; *Students' Fl.* (1899) 231. C. retusa *Hook. f. in Lond. Journ. Bot.* iii (1844) 415 (*not of Petrie*). C. lucida *Endl. Prodr. Fl. Ins. Norf.* (1833) 60 (*not of Forst.*). C. Stocki *Barbier in Rev. Hort. Belg.* iii (1877) t. 12.

Kermadec Islands, North and South Islands: Common on sea-cliffs and sand-dunes as far south as Marlborough and Greymouth. *Angiangi; Naupata.* September–November.

I have followed Sir J. D. Hooker and others in considering this to be the same as the Norfolk Island *C. Baueri;* but Mr. W. R. B. Oliver (Trans. N.Z. Inst. xlix (1917) 153) treats it as distinct, apparently relying on the broader leaves and stouter petioles. But the differences appear to be very slight; and, considering the great variability of most of the species, I think it is better to keep the two under one name until the matter can be fully investigated.

6. **C. chathamica** *Cockayne in Trans. N.Z. Inst.* xxxiv (1902) 317.—A tree 15–40 ft. high, with a trunk sometimes 2 ft. in diam.; bark greyish-brown; branchlets obscurely tetragonous, more or less clothed with short stiff greyish hairs. Leaves $1\frac{1}{2}$–3 in. long, about 1 in. broad, oblong or obovate-oblong or obovate, obtuse or subacute, narrowed into a rather slender petiole, subcoriaceous, dark-green or glossy above, paler beneath, glabrous except the petioles and a few scattered hairs along the midrib and margins; veins conspicuously reticulated beneath. Male flowers not seen. Female flowers in few-flowered fascicles. Calyx-limb cupular, truncate. Corolla deeply 4-lobed. Drupe large, oblong-ovoid, rather more than $\frac{1}{3}$ in. long, yellowish-red.—*Cheesem. Man. N.Z. Fl.* (1906) 248.

Chatham Islands: Abundant, *H. H. Travers! G. Mair! Cox* and *Cockayne!* November–February.

I have only seen imperfect specimens of this, but it appears to differ from both *C. Baueri* and *C. petiolata* in the much greater size and tree-like habit of growth, the coarser and almost shaggy pubescence on the young branchlets (in *C. petiolata* the pubescence is very short, fine, and even), and in the larger leaves.

7. **C. petiolata** *Hook. f. in Journ. Linn. Soc.* i (1857) 128.—A shrub or small tree 6–15 ft. high; bark pale-grey; branchlets terete or obscurely tetragonous, uniformly clothed with a fine ashy-grey pubescence. Leaves 1–2 in. long, elliptic-oblong or obovate, rounded at the apex, narrowed into a short slender petiole, subcoriaceous, glabrous or the petiole and veins beneath puberulous; margins flat or very slightly recurved. Stipules deltoid, acuminate. Male flowers in compact rounded heads on short axillary puberulous peduncles. Calyx-limb obscure. Corolla campanulate, $\frac{1}{5}$ in. long, deeply 4-lobed. Females in 3–6-flowered fascicles. Calyx cupular or obscurely toothed. Corolla tubular, 3–5-toothed. Fruit ovoid-oblong, $\frac{1}{6}$–$\frac{1}{4}$ in. long, red.—*Handb. N.Z. Fl.* (1864) 113; *T. Kirk Students' Fl.* (1899) 232; *Cheesem. Man. N.Z. Fl.* (1906) 248; *W. R. B. Oliver in Trans. N.Z. Inst.* xlii (1910) 171.

KERMADEC ISLANDS: Abundant throughout the group, *McGillivray, T. F. C., W. R. B. Oliver!* May–September.

Very closely allied to *C. Baueri*, but easily separated by the uniform grey pubescence of the branchlets, and by the smaller flat leaves with much more slender petioles. I have seen no specimens from the mainland of New Zealand, and fear that the locality of "maritime rocks south of Castlepoint," given in the Handbook, is erroneous.

8. **C. robusta** *Raoul in Ann. Sci. Nat.* Ser. iii, 2 (1844) 121.—A stout erect glossy-green shrub 5–15 ft. high, perfectly glabrous in all its parts; bark greyish-brown. Leaves numerous, 1½–5 in. long, elliptic-oblong to elliptic-lanceolate, acute or rarely obtuse, narrowed into a short stout petiole, coriaceous, dark-green and shining above, paler beneath; margins sometimes slightly recurved. Peduncles short, stout, simple or branched, bearing dense many-flowered glomerules. Male flowers: Calyx minute, cupular, obsoletely 4–5-toothed or quite truncate. Corolla campanulate, ¼–⅓ in. long, 4–5-lobed. Females: Much smaller, ⅕–⅙ in. Corolla tubular, shortly 3–5-lobed. Drupes crowded, oblong to ovoid, ¼–⅓ in. long, yellowish- or reddish-orange.—*Choix* (1846) 23, t. 21; *Hook. f. Fl. Nov. Zel.* i (1853) 105; *Handb. N.Z. Fl.* (1864) 113; *Cheesem. in Trans. N.Z. Inst.* xix (1887) 234; *T. Kirk Students' Fl.* (1899) 233; *Cheesem. Man. N.Z. Fl.* (1906) 248. C. coffoeoides *Col. in Trans. N.Z. Inst.* xxi (1889) 87.

Var. **angustata** *Kirk l.c.*—Leaves smaller, ¾–2 in. long, ¼–½ in. broad, linear-oblong or lanceolate. Includes var. *parva* T. Kirk *l.c.*

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Abundant throughout, ascending to 2500 ft. *Karamu.* August–October.

The most generally distributed of all the New Zealand species.

9. **C. Cunninghamii** *Hook. f. Handb. N.Z. Fl.* (1864) 113.—A large sparingly branched shrub 6–15 ft. high; bark pale; branches ascending. Leaves erect, ½–2 in. long, linear or linear-lanceolate, acute or subacute, gradually narrowed into a short stout petiole, flat, coriaceous. Flowers sessile in 3–12-flowered glomerules or terminating short arrested branchlets. Males: Calyx minute, cupular, truncate or obscurely lobed. Corolla campanulate, ⅛–⅙ in. long, 4–5-lobed. Females smaller and less numerous. Calyx-limb 4–5-toothed. Corolla tubular, 3–5-lobed. Styles very long and slender. Drupe broadly oblong, ¼ in. long, pale and translucent.—*Cheesem. in Trans. N.Z. Inst.* xix (1887) 234; *T. Kirk Students' Fl.* (1899) 233; *Cheesem. Man. N.Z. Fl.* (1906) 249. C. foetidissima *A. Cunn. Percur.* (1838) n. 471 (*in part*), (*not of Forst.*).

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS: Not uncommon in lowland swampy forests, especially in rich alluvial soils. *Mingimingi.* August–September.

Very closely allied to *C. robusta*, but distinguished by the linear leaves, fewer flowers, and translucent fruit. Intermediate states are not uncommon, and are often difficult to place in the absence of fruit. Dr. Cockayne considers that it is a hybrid between *C. robusta* and *C. propinqua*.

10. **C. acutifolia** *Hook. f. in Journ. Linn. Soc.* i (1857) 128.—A glabrous shrub or small tree 8–20 ft. high; bark pale; branches slender, spreading. Leaves 1½–4 in. long, lanceolate or ovate-lanceolate to elliptic-ovate, acuminate, narrowed into a slender petiole ¼–½ in. long, thin and membranous; veins finely reticulated. Peduncles slender, longer than the petioles, simple or trichotomously divided; branches ending in little fascicles of 2 or 3 flowers. Male flowers rather large, ⅓ in. long. Calyx minute,

cupular. Corolla broadly funnel-shaped, 4–5-lobed. Female flowers smaller and fewer. Calyx-limb with 4–5 linear teeth. Corolla tubular, 3–5-lobed. Drupe oblong, $\frac{1}{4}$ in. long, reddish-orange.—*Handb. N.Z. Fl.* (1864) 114; *Cheesem. in Trans. N.Z. Inst.* xx (1888) 169; *T. Kirk Students' Fl.* (1899) 233; *Cheesem. Man. N.Z. Fl.* (1906) 249.

Kermadec Islands: Abundant on Sunday or Raoul Island, ascending to the tops of the hills, alt. 1700 ft., *McGillivray, T. F. C., W. R. B. Oliver!* May–September.

A very distinct species, at once recognized by the comparatively narrow thin and membranous leaves and lax inflorescence. It is very closely allied to my *C. laevigata*, from Rarotonga.

11. **C. tenuifolia** *Cheesem. in Trans. N.Z. Inst.* xviii (1886) 315.—A sparingly branched shrub 8–15 ft. high, glabrous, or the petioles and midribs of the young leaves minutely hairy; branches slender, terete; bark pale. Leaves $1\frac{1}{2}$–4 in. long, ovate or oblong-ovate to ovate-lanceolate or elliptic-lanceolate, acute or acuminate, narrowed into slender petioles $\frac{1}{4}$–$\frac{3}{4}$ in. long, thin and membranous or rarely subcoriaceous, dull brownish-green above, paler below; veins conspicuous on both surfaces, finely reticulated. Stipules rather large, broadly deltoid, margins ciliate when young. Male flowers crowded in axillary 3–8-flowered fascicles or terminating arrested branchlets. Calyx apparently wanting. Corolla campanulate, 4–5-lobed. Female flowers not seen. Fruit in dense fascicles of 3–8 on short lateral branchlets, $\frac{1}{4}$–$\frac{1}{3}$ in. long, ovoid or oblong.—*T. Kirk Students' Fl.* (1899) 234; *Cheesem. Man. N.Z. Fl.* (1906) 250.

North Island: Te Aroha, Pirongia, and Karioi Mountains, *T. F. C.;* Mount Hikurangi, *Adams* and *Petrie!* Lake Waikaremoana, *Bishop Williams! E. Best!* Ruahine Mountains, *Colenso! B. C. Aston!* Mount Egmont Ranges, *T. F. C.;* abundant in the Upper Wanganui and Rangitikei Valleys, *T. Kirk!* Mount Kakaramea and Mount Pihanga, near Taupo, *T. F. C.;* forests to the west of Ruapehu and at Waimarino, *T. F. C., Spencer! Cockayne.* 1000–4000 ft.

Distinguished from *C. robusta* by the membranous pale-brown leaves and smaller glomerules. From *C. acutifolia* it is separated by the broader leaves with coarser venation and by the compact inflorescence.

12. **C. arborea** *T. Kirk in Trans. N.Z. Inst.* x (1878) 420.—A closely branched round-headed tree 15–30 ft. high; trunk 6–18 in. diam.; branchlets slender, puberulous towards the tips. Leaves 1–$2\frac{1}{2}$ in. long, ovate-spathulate or orbicular-spathulate, obtuse or retuse, suddenly narrowed into winged petioles $\frac{1}{4}$–$\frac{3}{4}$ in. long, coriaceous, yellow-green above, often reddish beneath; veins reticulated; margins flat. Stipules short, deltoid, ciliate when young. Flowers densely crowded in many-flowered rounded glomerules or heads, terminating short axillary branchlets or at the ends of larger shoots. Male flowers: Calyx narrow, deeply divided into 4–5 ciliate lobes. Corolla short, $\frac{1}{5}$ in. long, campanulate, deeply 4–5-lobed. Females: Smaller and shorter, in 4–12-flowered fascicles. Calyx-limb 4–5-toothed. Corolla tubular. Drupes closely packed, broadly oblong or almost globose, $\frac{1}{4}$ in. diam., colourless and translucent.—*Cheesem. in Trans. N.Z. Inst.* xix (1887) 236; *T. Kirk Forest Fl.* (1889) t. 132; *Students' Fl.* (1899) 234; *Cheesem. Man. N.Z. Fl.* (1906) 250.

North Island: Not uncommon in woods from the North Cape to the Lower Waikato. Sea-level to 1500 ft. October–November.

One of the largest species of the genus, and one of the most distinct. The calyx of the male flowers is better developed and has deeper divisions than in any other species.

13. **C. spathulata** *A. Cunn. Precur.* (1838) n. 479.—A small sparingly branched shrub 2–5 ft. high, rarely more; branches slender, young ones puberulous. Leaves rather distant, variable in size, ½–1½ in. long; blade orbicular or broadly or transversely oblong, obtuse or retuse or emarginate, suddenly contracted into a narrow winged petiole longer or shorter than the blade, coriaceous, glossy; margins recurved; veins few. Stipules triangular, cuspidate. Flowers sessile, axillary, solitary or in 2–3-flowered fascicles. Males: Seated in an involucel composed of a pair of depauperated leaves and their stipules, drooping. Calyx deeply 4–5-lobed. Corolla campanulate, ⅕ in. long, 4–5-lobed to the middle, lobes revolute. Stamens usually 4. Females: Generally solitary, smaller and narrower than the males. Calyx-limb deeply 4-toothed, teeth acute. Corolla tubular, deeply 3–4-lobed. Drupe globose or nearly so, ¼ in. diam., black, very rarely red.—*Raoul Choix* (1846) 46; *Hook. f. Fl. Nov. Zel.* i (1853) 104; *Handb. N.Z. Fl.* (1864) 114; *Cheesem. in Trans. N.Z. Inst.* xix (1887) 237; *T. Kirk Students' Fl.* (1899) 234; *Cheesem. Man. N.Z. Fl.* (1906) 234.

North Island: Abundant in lowland forests from the North Cape to the Upper Waikato. August–September.

Allied to *C. arborea*, from which it is easily separated by the small size, straggling habit, smaller leaves on longer petioles, fewer flowers, and solitary black fruit. The leaves are often a bronzy colour, shining and polished on the upper surface. Mr. Carse states that in Mongonui County the berries are quite frequently red or even orange—a very rare occurrence near Auckland.

14. **C. rotundifolia** *A. Cunn. Precur.* (1838) n. 473.—A laxly branched shrub 4–12 ft. high; branches long and slender, widely spreading, irregularly and sparsely branched, the young ones densely pubescent or almost villous towards the tips; bark greyish-brown. Leaves distant, ¼–1 in. long, usually orbicular, but varying to broadly oblong or ovate-oblong, cuspidate or abruptly acute, rarely obtuse, thin and membranous, more or less pubescent and ciliate, especially on the margins and veins, finely reticulated; petioles short, villous. Flowers sessile, in axillary few- or many-flowered fascicles, rarely solitary. Males: Calyx wanting. Corolla $\frac{1}{10}$ in. long, broadly campanulate, deeply 4-lobed. Female flowers smaller and narrower. Calyx-limb minutely 4-toothed. Corolla tubular, 3–4-lobed. Drupe globose or broader than long, often didymous, ⅙ in. diam., red.—*Raoul Choix* (1846) 46; *Hook. f. Fl. Nov. Zel.* i (1853) 108; *Handb. N.Z. Fl.* (1864) 114; *Cheesem. in Trans. N.Z. Inst.* xix (1887) 237; *T. Kirk Students' Fl.* (1899) 235; *Cheesem. Man. N.Z. Fl.* (1906) 251. C. rufescens *Col. in Trans. N.Z. Inst.* xviii (1886) 261.

North and South Islands: Abundant in damp forests, by the side of rivers, &c. Sea-level to 2000 ft. September–October.

The spreading habit, broad membranous leaves, villous branchlets, small fascicled flowers, and small globose or didymous red drupes are the best marks of this common species. *C. areolata* is distinguished by its fastigiate habit, smaller acute leaves, and black drupe; *C. tenuicaulis* by being more glabrous, by the much smaller leaves, and by the black drupe; while *C. rubra* is at once separated by the nearly glabrous branchlets and oblong yellow fruit. The leaves are often blotched, and are usually more or less deciduous, so that the plant is often quite bare in spring.

15. **C. areolata** *Cheesem. in Trans. N.Z. Inst.* xviii (1886) 315.—An erect closely branched shrub or small tree 6–15 ft. high; branches slender, fastigiate, ultimate pubescent or villous with soft greyish hairs. Leaves ⅓–⅔ in. long, orbicular-spathulate to ovate- or elliptic-spathulate, acute or

apiculate, abruptly narrowed into short hairy petioles, thin and membranous, flat, glabrous or nearly so above, usually pubescent on the veins beneath; veins forming large areoles. Flowers axillary, solitary or in 2–4-flowered fascicles. Male flowers: True calyx wanting, but 1 or 2 calycine involucels closely invest the base of the corolla. Corolla broadly campanulate, $\frac{1}{8}$ in. long, deeply 4–5-lobed. Female flowers: Solitary or 2 together, $\frac{1}{10}$ in. long. Calyx truncate or obscurely 4-toothed. Corolla narrow funnel-shaped, shortly 4-lobed. Drupe globose, $\frac{1}{6}$ in. diam., black or nearly so when fully ripe.—*T. Kirk Students' Fl.* (1899) 235; *Cheesem. Man. N.Z. Fl.* (1906) 252; *Ill. N.Z. Fl.* i (1914) t. 81.—C. multiflora *Col. in Trans. N.Z. Inst.* xxi (1889) 86.

North and South Islands: Not uncommon in lowland forests throughout. Sea-level to 1500 ft. September–October.

The fastigiate habit makes this species easy of recognition. Its nearest ally is *C. tenuicaulis*, which is separated by its smaller size, spreading branches, dark-coloured bark, more glabrous leaves and branchlets, and smaller and more coriaceous leaves. The lengthened period that this species requires for the ripening of its fruit is peculiar. Most of the lowland species flower in early spring—that is, from the middle of August to the middle of October, according to the species, the fruit maturing during the following autumn, usually in April and May. *C. areolata*, however, departs from this rule. It flowers at the usual time, which in the North Island is in the month of September or beginning of October; but the fruit is not mature until the December of the following year, or not until after the lapse of fifteen months. On the same tree can be seen perfectly ripe fruit and immature berries which will not ripen until the following December.

16. **C. tenuicaulis** *Hook. f. Fl. Nov. Zel.* i (1853) 106.—A much-branched shrub 4–8 ft. high; bark purplish-brown; branches slender, spreading, often interlaced, young ones finely puberulous. Leaves $\frac{1}{4}$–$\frac{1}{2}$ in. long, rarely more, orbicular- or ovate-spathulate, rounded at the apex, obtuse or subacute, abruptly narrowed into a short flat petiole, somewhat coriaceous, flat, glabrous on both surfaces; veins reticulated in large areoles. Flowers axillary, solitary or in 2–3-flowered fascicles, involucellate. Male flowers: Calyx wanting. Corolla campanulate, $\frac{1}{8}$–$\frac{1}{6}$ in. long, 4–5-lobed. Female flowers smaller and shorter. Calyx-limb truncate. Corolla tubular, 3–5-lobed. Drupe globose or depressed, $\frac{1}{8}$ in. diam., shining-black.—*Handb. N.Z. Fl.* (1864) 115; *Cheesem. in Trans. N.Z. Inst.* xix (1887) 239; *T. Kirk Students' Fl.* (1899) 236; *Cheesem. Man. N.Z. Fl.* (1906) 252.

Var. **major** *Cheesem.*—Leaves much larger and more membranous, $\frac{3}{4}$–$1\frac{1}{4}$ in. long; blade orbicular, suddenly narrowed into a long flat petiole often equalling the blade. Flowers and fruit apparently as in the type. Perhaps a distinct species.

North Island: Abundant in marshy forests or open turfy swamps from the North Cape to Hawke's Bay and south Taranaki. South Island: Marlborough—Pelorus Valley, *Cockayne!* Tuamarina Swamp, near Blenheim, *J. H. Macmahon!* Nelson—Vicinity of Westport, *Petrie!* Westland—Near Ross, *Cockayne!* Var. *major*: Mongonui County, Lower Waikato, *H. Carse!* Sea-level to 1000 ft. September–October.

T.71:93.

17. **C. rhamnoides** *A. Cunn. Precur.* (1838) n. 474.—A small densely branched shrub 2–6 ft. high; bark reddish-brown, uneven; branches numerous, spreading, often rigid and interlaced when growing in exposed places; young shoots more or less clothed with a short white pubescence. Leaves $\frac{1}{4}$–$\frac{3}{4}$ in. long, $\frac{1}{8}$–$\frac{1}{2}$ in. broad, very variable in shape and texture,

C. polymorpha W.Otis. l.c. 1935:92. S.Id.

orbicular or broadly ovate to narrow-oblong, in some varieties with lanceolate or linear leaves mixed with the broader ones, rounded retuse or acute, abruptly narrowed into a very short petiole, coriaceous or almost membranous, glabrous or puberulous beneath; veins reticulated, evident except in the more coriaceous forms. Flowers axillary, solitary or in 2–3-flowered fascicles, involucellate. Male flowers: Calyx wanting. Corolla campanulate, $\frac{1}{10}$ in. long, 4–5-lobed to below the middle, lobes often recurved. Female flowers smaller and narrower. Calyx-limb truncate or obsoletely toothed. Corolla tubular, deeply 4-cleft; lobes narrow, revolute. Drupe globose, $\frac{1}{6}$ in. diam., usually bright-red or reddish-black, rarely quite black.—*Cheesem. in Trans. N.Z. Inst.* xix (1887) 239; *T. Kirk Students' Fl.* (1899) 236; *Cheesem. Man. N.Z. Fl.* (1906) 252.

Two main forms are distinguishable, as follows:—

Var. **vera.**—Leaves orbicular or broadly ovate, obtuse, often coriaceous.—C. rhamnoides *A. Cunn.*; *Hook. f. Fl. Nov. Zel.* i (1853) 107; *Handb. N.Z. Fl.* (1864) 116. C. concinna *Col. in Trans. N.Z. Inst.* xvi (1884) 330. C. orbiculata *Col. l.c.* xxii (1890) 465.

ident. w. type. Otis. p 91.

Var. **divaricata.**—Leaves broadly ovate, oblong-ovate, or oblong, acute or subacute, rather thin. Narrower leaves, linear or lanceolate, often mixed with the broader ones.—C. divaricata *A. Cunn. Precur.* (1838) n. 476 (*not of Hook. f.*). C. heterophylla *Col. in Trans. N.Z. Inst.* xviii (1886) 263. ? C. gracilis *A. Cunn. Precur.* (1838) n. 475.

North and South Islands, Stewart Island: Abundant throughout, ascending to 3000 ft. August–October.

An exceedingly variable and puzzling species, for a fuller account of which reference should be made to my revision of the genus, published in the "Transactions of the New Zealand Institute," vol. xix (1887) 239.

18. **C. neglecta** *Cheesem. in Trans. N.Z. Inst.* xliv (1912) 160.—A much-branched prostrate shrub 2–5 ft. long; branches wide-spreading; bark greyish-brown; branchlets stout or slender, the ultimate ones uniformly clothed with a fine greyish pubescence, which often extends up the petioles to the main veins of the leaves. Leaves very variable in shape and size, usually $\frac{1}{3}$–$\frac{1}{2}$ in. long by $\frac{1}{4}$–$\frac{1}{2}$ in. wide, oblong or oblong-spathulate to broadly oblong or orbicular, sometimes broader than long and thus transversely oblong, obtuse, usually narrowed into a rather slender petiole, but sometimes rounded or truncate at the base, thick and somewhat fleshy, margins recurved, veins reticulated, conspicuous beneath. Flowers not seen, but apparently terminating short lateral branchlets. Drupe (immature) about $\frac{1}{5}$–$\frac{1}{4}$ in. long, oblong.

= C. repens x rhamnoides acc. W.Otis.

North Island: On the faces of cliffs near the North Cape, January, 1896, *T. F. C.*

As a rule, it is not advisable to describe species of *Coprosma* unless either good flowers or ripe fruit have been obtained. In this instance, however, the creeping habit, slender branchlets clothed with a fine and even greyish-white pubescence, the thick and fleshy broad obtuse leaves, and the fact that the immature fruit is oblong are characters which in combination remove it from all described species. Its nearest ally is probably *C. rhamnoides*, from which it differs in the prostrate stem, in the densely pubescent branchlets and petioles, thick and fleshy leaves, and in the oblong drupes.

19. **C. ciliata** *Hook. f. Fl. Antarct.* i (1844) 22.—A much-branched bush 4–10 ft. high, sometimes forming almost impenetrable thickets; branches stout or slender, lax or dense, young ones villous with rather

rigid hairs; bark pale, almost white. Leaves tufted on short lateral branchlets, $\frac{1}{4}$–$\frac{2}{3}$ in. long, oblong or oblong-obovate, rarely narrower and linear-oblong, obtuse or subacute, narrowed into a very short petiole, flat, rather membranous, under-surface slightly pubescent, margins and petiole ciliate; veins obscure, not reticulated. Stipules broad, acute, villous. Flowers unknown. Drupe (only a single specimen seen) subglobose, $\frac{1}{5}$ in. diam., black.—*Handb. N.Z. Fl.* (1864) 115; *T. Kirk Students' Fl.* (1899) 237; *Cheesem. Man. N.Z. Fl.* (1906) 253; *Subantarctic Is. N.Z.* ii (1909) 411. C. parviflora *var.* pilosa *Cheesem. in Trans. N.Z. Inst.* xix (1887) 241.

South Island, Stewart Island, Auckland and Campbell Islands, Antipodes Island: Not uncommon on the central and western portions of the Southern Alps, from Mount Arthur southwards. 1000–3500 ft.

Although flowering specimens have still to be obtained, a comparison of the foliage leaves no doubt in my mind that my *C. parviflora* var. *pilosa* is identical with Hooker's *C. ciliata* from the Auckland and Campbell Islands. I understand that Dr. Cockayne holds the same view.

20. **C. parviflora** *Hook. f. Fl. Nov. Zel.* i (1853) 107.—An erect much-branched leafy shrub 4–15 ft. high; branches stout or slender, often spreading in a horizontal plane; branchlets densely pubescent or villous; bark pale-grey. Leaves usually close-set, fascicled on short lateral branchlets, $\frac{1}{4}$–$\frac{3}{4}$ in. long, obovate or linear-obovate or linear-oblong, rounded at the top or rarely subacute, narrowed into a short petiole, coriaceous, glabrous or the petioles and midrib pubescent; margins flat or slightly recurved; veins not conspicuous. Stipules broad, pubescent or villous. Flowers involucellate, solitary or in 2–4-flowered fascicles. Male flowers: Calyx wanting. Corolla $\frac{1}{10}$ in. long, broadly campanulate, 4–5-partite almost to the base. Female flowers: Calyx-limb minutely 4–5-toothed. Corolla $\frac{1}{12}$ in., tubular, 4-lobed. Drupe globose, $\frac{1}{8}$ in. diam., variable in colour, bluish or violet-blue or quite black.—*Handb. N.Z. Fl.* (1864) 116; *Cheesem. in Trans. N.Z. Inst.* xix (1887) 241; *T. Kirk Students' Fl.* (1899) 238; *Cheesem. Man. N.Z. Fl.* (1906) 253; *Subantarct. Is. N.Z.* ii (1909) 410. C. myrtillifolia *Hook. f. Fl. Antarct.* i (1844) 21; *Fl. Nov. Zel.* i (1853) 108.

Var. **dumosa** *Cheesem. Man. N.Z. Fl.* (1906) 254.—Branches stiff and rigid, often interlacing, villous. Leaves smaller, $\frac{1}{6}$–$\frac{1}{3}$ in. long, narrow linear-oblong, very thick and coriaceous. Probably only a stunted mountain form.

North and South Islands, Stewart Island, Auckland and Campbell Islands: Abundant throughout. Sea-level to 4500 ft.

I think that there are two distinct species confounded under the above; one, the northern form, abundant in the Bay of Islands and Mongonui Counties, and remarkable for its flat spreading branches. The name "*parviflora*" should be confined to this, to which it was first applied. The mountain form, so abundant from Mount Egmont southwards to the Auckland and Campbell Islands, is identical with Hooker's *C. myrtillifolia*, and probably should retain that name. I postpone making the change until accurate descriptions of the flowers and fruit of both species can be made.

21. **C. ramulosa** *Petrie in Trans. N.Z. Inst.* xxvii (1895) 405.—A slender much-branched prostrate or decumbent shrub 2–4 ft. high; branches wide-spreading, the younger ones faintly pubescent; bark pale-brown or grey. Leaves opposite or fascicled on opposite twigs, $\frac{1}{3}$ in. long, about $\frac{1}{8}$ in. broad, linear-obovate, rounded at the apex, narrowed into a short petiole or almost sessile, coriaceous or almost membranous, margins flat,

veins indistinct. Stipules deltoid, acute, pale-grey or almost white. Male flowers solitary, terminating short lateral branchlets, involucellate. Calyx wanting. Corolla $\frac{1}{6}$ in., campanulate, 4–5-partite. Female flowers not seen. Drupe globose, $\frac{1}{6}$ in. diam., dark-red.—*T. Kirk Students' Fl.* (1899) 236; *Cheesem. Man. N.Z. Fl.* (1906) 254. C. pubens *Petrie l.c.* xxvi (1894) 267 (*not of A. Gray*).

North Island: Mount Hikurangi, *Petrie!* Mount Egmont, *T. F. C.*; Ruahine and Kaimanawa Mountains, *B. C. Aston!* Mount Hector, *Petrie!* South Island: Nelson—Clarence Valley, *T. F. C.*; Lake Tennyson, *R. M. Laing!* Canterbury—Mount Torlesse, *Cockayne*; Arthur's Pass and Kelly's Hill, *Petrie! T. Kirk! Cockayne! T. F. C.*; Broken River, *Cockayne! T. F. C.*; Mount Peel, *H. H. Allan!* Mount Arrowsmith, *Cockayne*; Clinton Valley, *Cockayne*; Eyre Mountains, *Poppelwell.* Stewart Island: Mount Anglem and Table Hill, *Cockayne.* 2500–5000 ft.

In foliage this species approaches certain states of *C. parviflora*, and the fruit resembles that of *C. rhamnoides*; but it differs from both in the slender rambling or prostrate habit.

22. **C. Buchanani** *T. Kirk in Trans. N.Z. Inst.* xxiv (1892) 424.—A much and closely branched shrub 5–10 ft. high; branches numerous, ascending, younger ones finely pubescent; bark reddish-brown. Leaves distant, $\frac{1}{2}$–1 in. long, broadly oblong or obovate, obtuse or minutely apiculate, narrowed into a short pubescent petiole, rather coriaceous, puberulous and minutely ciliate when young, margins thickened. Stipules deltoid, acute, minutely ciliate. Male flowers unknown. Female flowers axillary, solitary or in 2–3-flowered fascicles, involucellate. Calyx-limb minutely 4–5-toothed. Corolla narrow-campanulate, 4–5-lobed to the middle; segments acute, recurved. Styles stout. Fruit "globose, white, translucent" (*B. C. Aston*).—*Cheesem. Man. N.Z. Fl.* (1906) 239.

North Island: A few localities on the coast near Cape Terawhiti, Cook Strait, *T. Kirk! Buchanan! B. C. Aston! E. Phillips Turner!* October.

Apparently a very distinct species, the true affinities of which cannot be determined until male flowers have been observed. Mr. Aston (Trans. N.Z. Inst. xlii (1910) 26) gives the shape and colour of the fruit as "globose, white," but immature specimens sent to me by Mr. W. A. Thomson are oblong.

23. **C. Wallii** *Petrie n. sp.*—A compact rigid much-branched bush 4–6 ft. high; branches stout, spreading, widely divaricating, obscurely tetragonous; ultimate branchlets clothed with short fine pubescence; bark greyish-brown, uneven. Leaves in pairs on opposite twigs, or in fascicles on short lateral branchlets, $\frac{1}{8}$–$\frac{1}{4}$ in. long, $\frac{1}{12}$–$\frac{1}{8}$ in. broad, broadly oblong to suborbicular, more rarely broadly ovate-orbicular, obtuse, not retuse, thick and coriaceous, suddenly narrowed at the base into a short slender faintly pubescent petiole; margins slightly recurved when dry; veins evident beneath, forming large areoles, obscure on the upper surface. Male flowers in small fascicles just below the last pair of leaves, sessile, broadly campanulate; females solitary or fascicled, tubular. Fruit didymous, broader than long, $\frac{1}{5}$ in. diam., dark-red.

South Island: Canterbury—Poulter River, Upper Waimakariri, Peel Forest, *A. Wall!* 1800–2500 ft. November-December.

Apparently a distinct species, probably nearest to *C. crassifolia*, but amply distinct in both foliage and fruit.

24. **C. crassifolia** *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 289.—A much-branched rigid shrub 4–12 ft. high; branches divaricating, excessively stiff and rigid, often interlaced; branchlets glabrous or minutely puberulous; bark reddish-brown or greyish-brown, uneven and fissured on the branches, smoother on the twigs. Leaves $\frac{1}{4}$–$\frac{3}{4}$ in. long, rarely more, broadly oblong or obovate to orbicular, rounded at the tip or retuse, abruptly narrowed into a very short petiole, usually thick and coriaceous, often glaucous beneath; margins thickened; veins obscure. Flowers involucellate, solitary or more rarely in 2–3-flowered fascicles. Male flowers: Calyx wanting. Corolla $\frac{1}{5}$ in. long, campanulate, 4-partite almost to the base. Stamens 4. Female flowers: Calyx-limb minute, truncate or obsoletely toothed. Corolla tubular, $\frac{1}{8}$–$\frac{1}{7}$ in. long, deeply 4-lobed. Drupe $\frac{1}{4}$ in. long, subglobose or broadly oblong, yellow, sometimes white and translucent.—*Cheesem. in Trans. N.Z. Inst.* xix (1887) 242; *T. Kirk Students' Fl.* (1899) 238; *Cheesem. Man. N.Z. Fl.* (1906) 255. C. pendula *Col. in Trans. N.Z. Inst.* xxi (1889) 84.

North and South Islands: From Hokianga southwards to Otago, but often local. Sea-level to 1200 ft. September–November.

Best distinguished by the excessively stiff and rigid habit, almost glabrous branchlets, rounded coriaceous leaves, and subglobose yellow fruit. Mr. Colenso's *C. pendula* has much thinner leaves, but is not otherwise different. It is perhaps worth mention that Mr. Colenso's original locality for *C. crassifolia*, as given in the *Tasmanian Journal of Science*, is at the head of the Manukau Harbour, on "Scoria, and rocky spots"—in other words, the locality at present known as Penrose. A few specimens can still be observed there.

25. **C. rigida** *Cheesem. in Trans. N.Z. Inst.* xix (1887) 243.—An erect shrub 5–15 ft. high; branches divaricating, stout or slender, open or much interlaced, glabrous or the very young twigs puberulous; bark reddish- or purplish-brown. Leaves in opposite pairs on short lateral branchlets, $\frac{1}{4}$–$\frac{3}{4}$ in. long, obovate or oblong-spathulate, rounded or retuse, gradually narrowed into a short petiole, coriaceous or almost membranous, quite glabrous; veins obscure. Stipules deltoid, glabrous. Flowers involucellate, solitary or in 2–4-flowered fascicles. Male flowers: Calyx wanting. Corolla $\frac{1}{5}$ in. long, campanulate, 4–5-partite. Female flowers: Calyx-limb minutely 4–5-toothed. Corolla tubular, $\frac{1}{6}$–$\frac{1}{7}$ in., deeply 3–5-lobed. Drupe $\frac{1}{4}$–$\frac{1}{3}$ in. long, oblong or obovoid, yellow.—*T. Kirk Students' Fl.* (1899) 239; *Cheesem. Man. N.Z. Fl.* (1906) 255. C. divaricata *Hook. f. Fl. Nov. Zel.* i (1853) 107 (*in part*) (*not of A. Cunn.*). C. aurantiaca *Col. in Trans. N.Z. Inst.* xxii (1890) 464. C. lentissima *Col. l.c.* xxiv (1890) 465. C. turbinata *Col. l.c.* (1892) 389.

North and South Islands: Not uncommon in swampy lowland forests. September–October.

Very close to *C. crassifolia*, but not so rigid, the leaves narrower and less coriaceous, and the drupe narrower. In Mr. Colenso's herbarium there are numerous specimens of his three species quoted above. There can be no doubt whatever that they represent common states of *C. rigida*, and cannot be separated even as varieties.

26. **C. obconica** *T. Kirk Students' Fl.* (1899) 237.—An erect shrub 4–5 ft. high or more; bark pale; branches numerous, spreading, interlaced, younger ones pubescent or puberulous. Leaves $\frac{1}{8}$–$\frac{1}{4}$ in. long, $\frac{1}{16}$–$\frac{1}{12}$ in. broad, oblong or linear-oblong, obtuse or minutely apiculate, sessile or very shortly petiolate, coriaceous, glabrous; margins thickened, recurved; veins obscure. Flowers solitary or geminate, terminating short arrested

branchlets, involucellate, decurved. Male flowers: Calyx shortly funnel-shaped, teeth deltoid. Corolla broadly funnel-shaped, 4-lobed to the middle; lobes ovate, recurved. Female flowers: Corolla tubular, slightly ventricose at the base, teeth short, straight. Styles very long. Drupes $\frac{1}{8}$–$\frac{1}{6}$ in. diam., broadly obconic or obcordate, yellowish-white, almost translucent.—*Cheesem. Man. N.Z. Fl.* (1906) 256.

South Island: Nelson—Wairoa Gorge, *T. Kirk, D. S. Bryant!*

I only know this through a few specimens given to me by Mr. Bryant, who collected them in the same locality where the plant was originally observed by Mr. Kirk. There is little to separate it from *C. rigida* except that the fruit is slightly obconic.

27. **C. rubra** *Petrie in Trans. N.Z. Inst.* xvii (1885) 269.—An open or closely branched shrub 5–12 ft. high; branches slender, divaricating, glabrous or the very young ones puberulous; bark reddish-brown. Leaves $\frac{1}{4}$–$\frac{3}{4}$ in. long or more, broadly oblong or obovate to orbicular, rounded or subacute or apiculate, abruptly narrowed into long or short ciliolate petioles, rather membranous; veins obscurely reticulated. Flowers involucellate, solitary or in 2–4-flowered fascicles. Male flowers: Calyx wanting. Corolla $\frac{1}{6}$ in. long, campanulate, 4-partite. Stamens 4. Female flowers: Calyx-limb minutely 4-toothed. Corolla $\frac{1}{8}$ in. long, tubular, 4-lobed. Drupe $\frac{1}{4}$ in. long, oblong, yellowish-white, translucent.—*Cheesem. in Trans. N.Z. Inst.* xix (1887) 243; *T. Kirk Students' Fl.* (1899) 239; *Cheesem. Man. N.Z. Fl.* (1906) 256. C. divaricata *var.* latifolia *Hook. f. Fl. Nov. Zel.* i (1853) 107.

North Island: Hawke's Bay, *Colenso!* Ruahine Mountains, *B. C. Aston!* Mount Holdsworth, *B. C. Aston!* South Island: Nelson—Wairoa Gorge, ***D. S. Bryant*** and ***T. Kirk.*** Otago—Vicinity of Dunedin, Catlin's River, *Petrie!* Clifden and Tapanui, *B. C. Aston!* September–November.

In foliage and habit this has considerable resemblance to *C. rotundifolia;* but differs altogether in the flowers and fruit, which clearly place it in the neighbourhood of *C. rigida.* It was originally discovered by Mr. Colenso in some locality in the North Island.

28. **C. virescens** *Petrie in Trans. N.Z. Inst.* xi (1879) 426.—A glabrous much-branched shrub 5–10 ft. high; branches very slender, flexuose, spreading and interlaced; bark pale greyish-brown. Leaves $\frac{1}{5}$–$\frac{1}{3}$ in. long, spathulate or oblong-spathulate, obtuse or subacute, narrowed into a short slender petiole, membranous, quite glabrous; margins flat or slightly undulate. Stipules acute, ciliolate. Flowers involucellate, solitary or in 2–3-flowered fascicles. Male flowers: Calyx wanting. Corolla $\frac{1}{8}$ in. long, campanulate, 4-partite almost to the base. Female flowers: Calyx-limb obsoletely 4-toothed. Corolla shorter and narrower than in the males, tubular, deeply 4-lobed. Drupe $\frac{1}{4}$ in. long, oblong, yellowish-white, translucent.—*Cheesem. in Trans. N.Z. Inst.* xix (1887) 244; *T. Kirk Students' Fl.* (1899) 240; *Cheesem. Man. N.Z. Fl.* (1906) 257. C. divaricata *var.* pallida *Hook. f. Fl. Nov. Zel.* i (1853) 107.

North Island: Wairarapa and Hawke's Bay, *Colenso!* South Island: Marlborough—Pelorus Sound, *J. Rutland! J. H. Macmahon!* Nelson—Wairoa Gorge, ***D. S. Bryant*** and ***T. Kirk;*** near Foxhill, *T. F. C.;* Lake Tennyson, *R. M. Laing.* Canterbury—Lake Forsyth, *T. Kirk.* Otago—Vicinity of Dunedin, Otepopo, Kaitangata, Kurow, *Petrie!* Sea-level to 1500 ft. September—October.

A very distinct species, perhaps more nearly allied to *C. rubra* than any other.

C. intertexta sinp. Trans 75: 194 Central O.

29. **C. acerosa** *A. Cunn. Precur.* (1838) n. 477.—A low often excessively branched prostrate or suberect wide-spreading shrub 1–5 ft. high ; branches straight or flexuous or zigzag, often closely interlaced, younger ones puberulous ; bark yellowish-brown, often fissured and uneven. Leaves in close or distant opposite pairs or fascicles, $\frac{1}{4}$–$\frac{2}{3}$ in. long, about $\frac{1}{20}$ in. wide, erecto-patent, very uniform in shape, narrow-linear, obtuse or subacute, veinless. Flowers axillary, terminating minute arrested branchlets, involucellate. Male flowers : Solitary or in 2–4-flowered fascicles. Calyx wanting. Corolla $\frac{1}{6}$ in. long, campanulate, 4-partite to below the middle. Stamens 4. Female flowers solitary. Calyx-limb minutely 4-toothed. Corolla $\frac{1}{10}$ in. long, tubular, 4-lobed. Drupe globose, variable in size, $\frac{1}{6}$–$\frac{1}{3}$ in., pale-blue, translucent.—*Raoul Choix* (1846) 46 ; *Hook. f. Fl. Nov. Zel.* i (1853) 109 ; *Handb. N.Z. Fl.* (1864) 118 ; *Cheesem. in Trans. N.Z. Inst.* xix (1887) 244 ; *T. Kirk Students' Fl.* (1899) 240 ; *Cheesem. Man. N.Z. Fl.* (1906) 257 ; *Ill. N.Z. Fl.* i (1914) t. 84.

North and South Islands, Chatham Islands, Stewart Island : Abundant on sand-dunes and sandy beaches from the North Cape southwards.

Easily recognized by the peculiar scrambling and interlaced habit of growth, very narrow-linear leaves, and large globose pale sky-blue berries. It is universally present on all sand-dunes of any size.

(T. Kirk)

30. **C. brunnea** *Cockayne in Trans. N.Z. Inst.* xliii (1911) 374.—Closely allied to *C. acerosa*, but smaller, stouter, and much more sparingly branched ; bark dark-brown, often fissured. Branches shorter, divaricating or zigzag, stout and rigid. Leaves in distant opposite pairs or fascicles, rarely approximate, $\frac{1}{6}$–$\frac{1}{4}$ in. long, $\frac{1}{24}$ in. broad; obtuse or subacute, narrow-linear, shorter and more coriaceous than in *C. acerosa*. Flowers solitary or in 2–3-flowered fascicles. Male corolla $\frac{1}{8}$ in. long, 4-lobed to below the middle ; female corolla $\frac{1}{10}$ in. long, tubular, 4-lobed. Fruit broadly oblong or globose, $\frac{1}{5}$–$\frac{1}{4}$ in. long, pale-blue. — C. acerosa *var.* brunnea *T. Kirk Students' Fl.* (1899) 241 ; *Cheesem. Man. N.Z. Fl.* (1906) 257.

North Island : Mount Egmont Ranges, *T. F. C.* ; Tongariro and Ruapehu and the adjacent volcanic plateau, *Cockayne, T. F. C., Spencer !* Ruahine Mountains, *Colenso ! B. C. Aston !* South Island, Stewart Island : Not uncommon in mountainous districts from Nelson southwards. 2000–5000 ft. August–September.

This can only be distinguished from *C. acerosa* by its smaller size and more rigid habit, dark-brown colour, fewer short stout and rigid branches, and shorter and more distant coriaceous leaves. It is doubtful whether it is entitled to the rank of a species.

31. **C. rugosa** *Cheesem. Man. N.Z. Fl.* (1906) 1141.—A much and densely branched rigid erect shrub 4–10 ft. high ; branches stout, divaricating, often interlaced, glabrous or the younger ones puberulous ; bark fissured and uneven, dark-brown or dark red-brown, of the branchlets yellowish-brown. Leaves in opposite pairs or fascicles, $\frac{1}{4}$–$\frac{3}{4}$ in. long, $\frac{1}{25}$ in. broad, narrow-linear or narrow linear-spathulate, subacute or acute, spreading, veinless, narrowed into a short petiole or sessile ; stipules ciliolate. Flowers involucellate, axillary, terminating minute arrested branchlets. Male flowers solitary or in 2–3-flowered fascicles ; calyx wanting ; corolla $\frac{1}{4}$ in. long, campanulate, deeply 4-partite, stamens 4. Female flowers solitary or rarely two together ; calyx-limb 4-toothed ; corolla deeply 4-lobed. Drupe $\frac{1}{4}$–$\frac{1}{3}$ in. long, broadly oblong or almost globose, pale-blue, almost translucent.

North Is.

South Island: Nelson—Buller Gorge, *W. Townson!* Clarence Valley and Lake Tennyson, *T. F. C.* Westland—Common in lowland river-beds, *Cockayne! P. G. Morgan!* Canterbury—Arthur's Pass, *T. F. C.;* Mount Murray, Upper Rakaia, *Cockayne;* Mount Arrowsmith, *Cockayne* and *R. M. Laing;* Cass River, *Cockayne* and *Fowerakerl* Mount Peel, *H. H. Allan!* Mount Cook district, abundant, *T. F. C.* Otago—Vicinity of Dunedin, *Petrie!* Clinton Valley, *F. G. Gibbs!* Lake Hauroko, *J. Crosby Smith;* West Coast Sounds, *B. C. Aston!* Sea-level to 3000 ft.

Closely allied to *C. brunnea*, from which it differs in the much larger size and erect habit, longer and narrower often petioled leaves, in the longer calyx-lobes of the female flowers, and in the more oblong drupe. It is probably common in mountain districts throughout the South Island. T. 71:93. T 72:325.

Ann. Nat. Hist. 2 : 1838 : 206.

32. **C. propinqua** *A. Cunn. Precur.* (1838) n. 472.—A large branching shrub or small tree 6–20 ft. high; branches widely divaricating, young ones puberulous; bark brown or brownish-grey. Leaves opposite, or in opposite fascicles on short arrested branchlets, $\frac{1}{4}$–$\frac{1}{2}$ in. long, $\frac{1}{12}$–$\frac{1}{8}$ in. wide, linear or narrow linear-oblong or narrow linear-obovate, obtuse or subacute, gradually narrowed into a very short petiole or sessile, rather coriaceous; veins obscure. Flowers solitary or in 2–4-flowered fascicles, each fascicle invested by a 4-toothed cupuliform involucre, and each flower involucellate. Male flowers: Calyx wanting. Corolla $\frac{1}{6}$ in. long, campanulate, 4–5-partite. Female flowers: Calyx-limb 4-toothed. Corolla $\frac{1}{8}$ in. long, tubular, 3–4-lobed. Drupe $\frac{1}{3}$ in. long, globose or broadly oblong, bluish or bluish-black or quite black.—*Raoul Choix* (1846) 46; *Hook. f. Fl. Nov. Zel.* i (1853) 100; *Handb. N.Z. Fl.* (1864) 116; *Cheesem. in Trans. N.Z. Inst.* xix (1887) 245; *T. Kirk Students' Fl.* (1899) 241; *Cheesem. Man. N.Z. Fl.* (1906) 258. C. alba *Col. in Trans. N.Z. Inst.* xxiv (1892) 388.

var. typica W.Oliv. 1935 p. 66. N. Is., S. Is. Stew. Id.

North and South Islands, Stewart Island, Chatham Islands: Abundant throughout in swampy forests or by the side of rivers, &c. Sea-level to 1500 ft. *Mingimingi.* September–October.

Allied to *C. Cunninghamii*, but distinguished by the more spreading habit, dark bark, smaller narrower leaves, smaller and fewer flowers, and by the drupe not being white and translucent.

var. *martini* W.Oliv. l.c. Chatham Id.

33. **C. Kirkii** (*Cheesem. in Trans. N.Z. Inst.* xxix (1897) 391.—A much and closely branched procumbent or suberect shrub, often forming rounded masses 2–4 ft. high and the same in diam.; rarely taller, erect, and loosely spreading. Branches stout, often interlaced; branchlets obscurely tetragonous, usually more or less clothed with short greyish pubescence, rarely almost glabrous. Leaves opposite or in opposite fascicles, $\frac{1}{2}$–1 in. long, linear or narrow linear-oblong or narrow linear-obovate, obtuse or subacute, gradually narrowed into a very short petiole, flat, coriaceous or almost membranous; midrib evident below; lateral veins usually indistinct. Stipules very short, broad, ciliate. Flowers in 3–6-flowered fascicles on short arrested branchlets, rarely solitary. Male flowers: Calyx wanting. Corolla $\frac{1}{6}$ in. long, broadly campanulate, 4–5-partite. Female flowers smaller and narrower. Calyx-limb minutely 4-toothed. Corolla funnel-shaped, deeply 4-lobed. Drupe (immature) $\frac{1}{6}$ in. long, oblong.—*T. Kirk Students' Fl.* (1899) 241; *Cheesem. Man. N.Z. Fl.* (1906) 258. Plagianthus linariifolia *Buch. in Trans. N.Z. Inst.* xvi (1884) 394, t. 34, f. 1.

North Island: Auckland—Tapotopoto Bay, *T. Kirk!* coast between Spirits Bay and the North Cape, *T. F. C.;* near Ahipara, *R. H. Matthews! T. F. C.;* South Head of Hokianga Harbour, *T. Kirk!* Taranaki—Near Opunake, *T. Kirk!* Hawke's Bay—Portland Island, *Bishop Williams!*

C. antipoda W.Oliv. p. 4.6. (Plagianthus linariif. Buch.) South Id. Antipodes Id.

It is possible that more species than one may be included in the above description, but the material at my disposal is insufficient to determine this. Mr. Kirk's original specimens from Tapotopoto Bay are from a procumbent shrub with closely placed fascicled leaves and pubescent branchlets, and my own, from near the North Cape, agree in habit and the pubescent branches, but have larger spreading leaves. The Ahipara plant is erect, with lax almost glabrous branchlets, and still larger more distantly placed leaves; and Mr. Kirk's Opunake specimens are very similar. Bishop Williams's specimens, from Portland Island, are remarkable for the very pale bark and densely tomentose branchlets, the leaves being broader than the Ahipara specimens. The ripe fruit is unknown in all the forms, and the Ahipara plant is the only one of which good flowering specimens have been obtained.

34. **C. linariifolia** *Hook. f. Handb. N.Z. Fl.* (1864) 118.—A much-branched shrub or small tree 6–20 ft. high; trunk sometimes 9 in. diam.; branches slender, spreading, younger ones puberulous; bark dark-grey. Leaves all opposite, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, $\frac{1}{8}$–$\frac{1}{3}$ in. broad, linear or linear-lanceolate, rarely oblong-lanceolate, acute, suddenly narrowed into a short slender petiole, flat, coriaceous, blackish when dry; veins indistinct. Stipules glabrous or puberulous, upper ones connate into a long sheath; margins usually ciliate. Flowers terminating leafy branchlets, involucellate. Male flowers in 2–5-flowered fascicles, fascicles involucellate. Calyx wanting. Corolla $\frac{1}{6}$–$\frac{1}{4}$ in. long, broadly campanulate, 4–5-lobed to the middle; lobes revolute. Female flowers solitary. Calyx-limb with 4–5 large and erect linear-oblong lobes. Corolla $\frac{1}{8}$ in. long, tubular, 4–5-lobed. Drupe $\frac{1}{3}$ in. long, broadly oblong, crowned by the persistent calyx-lobes, at first pale and translucent, ultimately black.—*Cheesem. in Trans. N.Z. Inst.* xix (1887) 246; *T. Kirk Forest Fl.* (1889) t. 95; *Students' Fl.* (1899) 242; *Cheesem. Man. N.Z. Fl.* (1906) 259. C. propinqua var. γ *Hook. f. Fl. Nov. Zel.* i (1853) 109.

North and South Islands: Not uncommon from the Thames River southwards. Sea-level to 3000 ft. October–November.

Easily recognized by the long sheathing stipules. In several respects it approaches *C. propinqua* and *C. Cunninghamii*, but is easily distinguished by the different habit, thinner acute leaves, and by the long calyx-lobes of the female flowers.

[dropped by W.Oliv. l.c. p.8.]

35. **C. Solandri** *T. Kirk in Trans. N.Z. Inst.* xxix (1897) 522.—A much-branched shrub; branches stout, rigid, obscurely tetragonous; branchlets numerous, short, erect; bark whitish, setose. Leaves erect, loosely imbricating, $\frac{1}{3}$ in. long, $\frac{1}{10}$ in. broad, linear-lanceolate, acute or apiculate, very coriaceous; midrib sunken on both surfaces. Stipules setose, ciliate, loosely sheathing. Flowers not seen. Drupes solitary, terminal, seated in an involucel composed of two depauperated leaves and their stipules, $\frac{1}{4}$ in. long, broadly ovoid, crowned by the persistent calyx-lobes.—*Students' Fl.* (1899) 242; *Cheesem. Man. N.Z. Fl.* (1906) 259.

North Island: East Cape district, *Banks* and *Solander!*

This was described by Mr. Kirk from some specimens in the set of Banks and Solander's plants presented to the Dominion by the Trustees of the British Museum. The specimens, with many others, are now missing from the set, having probably been mislaid at the time of Mr. Kirk's decease. There are specimens, however, in the set of Banksian plants presented to my own herbarium from the same source. Unfortunately, they are not in flower, but the aspect of the plant appears to resemble that of *C. linariifolia.*

36. **C. foetidissima** *Forst. Char. Gen.* (1776) 138.—Usually a slender sparingly branched shrub 6–15 ft. high, but occasionally forming a small tree 20 ft. high, with a trunk 1 ft. in diam. or more; disgustingly foetid when bruised or while being dried. Branches slender, glabrous, or the very young ones minutely puberulous. Leaves variable in size and shape, 1½–2 in. long, ¼–¾ in. broad, usually oblong, but varying from linear-oblong or -obovate to rounded oblong or broad-ovate, obtuse or acute or retuse, abruptly narrowed into a rather long and slender petiole, slightly coriaceous or almost membranous; margins flat; midrib distinct; lateral veins obscure. Stipules short, cuspidate. Flowers sessile, terminating the branchlets. Male flowers solitary or 2–3 together. Calyx often wanting, when present minute, obscurely 4-toothed. Corolla ⅓–⅔ in. long, campanulate, 4–5-lobed to the middle, rarely 8–10-lobed. Stamens the same number as the lobes. Female flowers solitary, erect, ¼–⅓ in. long. Calyx-limb truncate or obscurely toothed. Corolla tubular, 3–4-lobed. Drupe ⅓ in. long, oblong or ovoid, red or yellowish-red, sometimes pale and translucent.—*A. Rich. Fl. Nouv. Zel.* (1832) 261; *A. Cunn. Precur.* (1838) n. 471; *Raoul Choix* (1846) 46; *Hook. f. Fl. Antarct.* i (1844) 20, t. 13; *Fl. Nov. Zel.* i (1853) 105; *Handb. N.Z. Fl.* (1864) 116; *Cheesem. in Trans. N.Z. Inst.* xix (1887) 247; *T. Kirk Students' Fl.* (1899) 242; *Cheesem. Ill. N.Z. Fl.* i (1914) t. 83; *Subantarct. Is. N.Z.* ii (1909) 411. C. affinis *Hook. f. Fl. Antarct.* i (1844) 21, t. 14. C. repens *A. Rich. Fl. Nouv. Zel.* (1832) 264 (*not of Hook. f.*). C. pusilla *Forst. f. Prodr.* (1786) n. 513. C. sagittata *Col. in Trans. N.Z. Inst.* xxxi (1899) 270.

North and South Islands, Chatham Islands, Stewart Island, Auckland and Campbell Islands: Abundant from the Thames goldfields and Raglan southwards. Sea-level to 4500 ft. *Karamu; Hupiro.* August–October.

Easily distinguished by the oblong leaves, large terminal flowers, and horribly disagreeable odour when bruised.

T. 71 (1944) 93.

37. **C. Colensoi** *Hook. f. Handb. N.Z. Fl.* (1864) 117.—A small and slender erect or rarely procumbent open or closely branched shrub 2–8 ft. high; bark pale-brown or whitish; young branches puberulous. Leaves opposite or fascicled on short lateral twigs, yellowish-green, very variable in size and shape, ⅛–1½ in. long, linear-oblong or linear-obovate to broadly oblong or obovate, obtuse or retuse, narrowed into rather slender petioles, coriaceous or almost membranous; margins flat, or recurved in the coriaceous forms; veins indistinct. Flowers terminating the branchlets, solitary on short decurved peduncles, involucellate. Male flowers: Calyx wanting. Corolla ⅕ in. long, campanulate, 4-lobed. Female flowers: Calyx-limb minutely 4-toothed. Corolla ⅙ in. long, tubular, 4-lobed; lobes revolute. Drupe ⅙–¼ in. long, oblong, dark-red.—*Cheesem. in Trans. N.Z. Inst.* xix (1887) 248; *T. Kirk Students' Fl.* (1899) 243; *Cheesem. Man. N.Z. Fl.* (1906) 260. C. myrtillifolia *var.* linearis *Hook. f. Fl. Nov. Zel.* i (1853) 108.

C. banksii, Petrie

North Island: From Mount Wynyard (Thames goldfields) and Te Aroha Mountain southwards to Hikurangi Mountain and Mount Egmont, thence to the central volcanic plateau and the Ruahine and Kaimanawa Mountains to the Tararua Mountains, not common. South Island: Marlborough—Queen Charlotte Sound, *J. H. Macmahon!* western portion of Nelson Province to Westland and the West Coast Sounds. Stewart Island: Abundant throughout. Usually from 1500 to 4000 ft., but descends to sea-level in Stewart Island. November–January.

A well-marked species, easily recognized by the rather broad leaves, and the terminal solitary flowers on decurved peduncles.

T. [illegible] Colensoi [illegible]

also l.c. 71 & 74

C. astoni Petrie : 44 : 1912 : 181 (Trans) South Id

38. **C. Banksii** *Petrie in Trans. N.Z. Inst.* xxx (1898) 433.—A small much-branched shrub 6–12 ft. high; branches slender, spreading; bark brownish-yellow, marked with two bands of short rusty-red hairs decurrent from the stipules. Leaves in opposite pairs or fascicled on short lateral twigs, straight or curved, gradually narrowed into short petioles, linear, $\frac{1}{2}$–1 in. long, $\frac{1}{12}$–$\frac{1}{8}$ in. broad, obtuse or almost truncate at the tip; margins ciliate, recurved; midrib evident, but leaf otherwise veinless. Stipules ovate-subulate, acute. Flowers solitary on short recurved peduncles terminating the branchlets, involucellate. Male flowers: Calyx wanting. Corolla $\frac{1}{6}$ in. long, campanulate, 4-lobed. Female flowers: Calyx-limb minutely 4-toothed. Corolla $\frac{1}{8}$ in. long, 4-lobed, tubular; lobes revolute. Drupe terminal, broadly oblong, $\frac{1}{5}$ in. long, dark-red.—C. Astoni *Petrie in Trans. N.Z. Inst.* xliv (1912) 181.

North Island: Mount Hikurangi, *Adams* and *Petrie!* Ruahine Mountains, *B. C. Aston!* Tararua Mountains, *Buchanan, Petrie!* Kaitoke, near Wellington, *Petrie!* South Island: Queen Charlotte Sound, *J. H. Macmahon!* Nelson—Mount Rochfort, *W. Townson! Petrie!* Westland—Mount Greenland, *Cockayne!* Southland—Takitimu Mountains, *Cockayne;* Longwood Range, *Petrie!* December–January.

This is certainly connected with *C. Colensoi* by transitional forms, and I consequently placed it under that species in the first edition of this work. But the usual state of the plant, with its narrow-linear curved leaves with their almost truncate apices, has a very distinct appearance, and perhaps it is best to treat the two plants as two distinct though closely allied species. Mr. Petrie's *C. Astoni* I regard as a mere form with still smaller and narrower leaves.

crenulata W. Oliv. Trans 49 : 153

but restored 1935 p.101

39. **C. retusa** *Petrie in Trans. N.Z. Inst.* xxvi (1894) 268.—A much-branched procumbent shrub; branches short, stout or slender, straggling; bark pale, marked by two opposite lines of pubescence interrupted at the nodes. Leaves $\frac{1}{4}$–$\frac{2}{3}$ in. long, linear-obovate or oblong-obovate, retuse or almost 2-lobed at the tip, gradually narrowed into a short stout petiole, thick and coriaceous, flat or concave above, midrib usually distinct beneath; margins thickened and recurved, very minutely crenulate. Stipules broad, with 3 cartilaginous teeth, ciliate. Flowers solitary, terminating short leafy branchlets. Male flowers: Calyx wanting. Corolla $\frac{1}{4}$–$\frac{1}{3}$ in. long, broadly campanulate, 4–5-partite. Female flowers: Calyx-limb with 4–5 subulate teeth. Corolla narrow-campanulate, 4–5-partite; segments narrow, revolute. Styles stout, sometimes 3. Drupe $\frac{1}{4}$ in. long, ovoid, yellowish-red.—*T. Kirk Students' Fl.* (1899) 243; *Cheesem. Man. N.Z. Fl.* (1906) 261.

South Island: Nelson—Mount Rochfort, *W. Townson!* Westland—Kelly's Hill, *Petrie!* Arthur's Pass, *Cockayne! T. F. C.* Southland—Clinton Saddle, Lake Te Anau, *Petrie!* Longwood Range, *T. Kirk!* 2000–3500 ft. December–January.

A very distinct species, easily known by the straggling habit, retuse leaves with minutely crenulate margins, and rather large terminal flowers. It has the disagreeable odour of *C. foetidissima* when bruised.

C pseudocuneata, Kirk. (mainland plant)

40. **C. cuneata** *Hook. f. Fl. Antarct.* i (1844) 21, t. 15.—A stout erect or spreading closely branched shrub 2–10 ft. high; branches woody and rigid, densely leafy, the younger ones puberulous; bark greyish-white to dark-brown. Leaves close-set, usually fascicled on short lateral branchlets, $\frac{1}{5}$–$\frac{3}{4}$ in. long, $\frac{1}{10}$–$\frac{1}{4}$ in. broad, linear- or oblong-obovate or cuneate-oblong, obtuse or subacute, almost sessile, patent or recurved, rigid and coriaceous, often concave above, almost veinless; margins slightly recurved. Stipules short and broad, usually densely fimbriate or ciliate. Flowers solitary,

P. cuneata, Hk f. Subantarctic Is. see Oliv. l.c. 68.

terminating the branchlets, sessile, involucellate. Male flowers: Calyx wanting. Corolla $\frac{1}{4}$ in. long, campanulate, 4–5-lobed. Female flowers: Calyx-limb 4–5-lobed; lobes unequal. Corolla $\frac{1}{5}$ in. long, 4-lobed to the middle. Drupe $\frac{1}{8}$–$\frac{1}{6}$ in. diam., globose, red.—*Fl. Nov. Zel.* i (1853) 110; *Handb. N.Z. Fl.* (1864) 117; *Cheesem. in Trans. N.Z. Inst.* xix (1887) 249; *T. Kirk Students' Fl.* (1899) 244; *Cheesem. Man. N.Z. Fl.* (1906) 961; *Subantarct. Is. N.Z.* (1909) 411. Trans 59:1928:729.

North Island: Mount Hikurangi, *Colenso, Adams* and *Petrie!* Ruahine Mountains and Lake Taupo, *Colenso;* Mount Egmont, *Dieffenbach, T. F. C.* South Island, Stewart Island, Auckland and Campbell Islands, Antipodes Island: Abundant in mountain districts. Usually from 2000 to 5000 ft., but descends to sea-level in the Auckland Islands. November–January.

A variable plant, but separated from any other by the densely leafy habit, coriaceous often recurved linear-obovate or cuneate leaves, broad fimbriate stipules, and rather large solitary terminal flowers. In alpine localities it is often dwarfed to a foot or two in height, with rigid and woody interlaced branches and small excessively coriaceous leaves.

41. **C. microcarpa** *Hook. f. Fl. Nov. Zel.* i (1853) 110.—A tall leafy shrub 6–12 ft. high; branches slender, close-set, divaricating, often flattened, finely pubescent; bark grey. Leaves in pairs on short lateral branchlets, $\frac{1}{4}$–$\frac{1}{3}$ in. long, $\frac{1}{15}$–$\frac{1}{12}$ in. broad, spreading, linear or linear-lanceolate, acute, flat, veinless, dark-brown when dry, firm but not coriaceous; stipules short, ciliate. Flowers minute. Male flowers: Calyx cup-shaped, minutely 4-toothed. Corolla campanulate, $\frac{1}{5}$ in. diam., 4-partite; lobes narrow, acuminate, long. Female flowers: Calyx-limb short, tubular, 4-toothed. Corolla $\frac{1}{12}$ in. long, tubular or funnel-shaped, 4-cleft $\frac{1}{4}$-way down. Drupe very small, globose, $\frac{1}{10}$ in. diam.—*Handb. N.Z. Fl.* (1864) 118; *T. Kirk Students' Fl.* (1899) 244; *Cheesem. Man. N.Z. Fl.* (1906) 260. ? C. margarita *Col. in Trans. N.Z. Inst.* xxviii (1896) 594.

North Island: Mountains near Lake Taupo and on the central volcanic plateau, Waimarino Plains, *T. Kirk! T. F. C., Adams! Cockayne;* Ruahine Mountains and Kaimanawa Mountains, *Colenso! Olsen! B. C. Aston!* Tararua Mountains, Mount Holdsworth, *Petrie!* Kaitoke, near Wellington, *Petrie.* South Island: Marlborough—Queen Charlotte Sound, Pelorus Valley, *J. H. Macmahon!* Nelson—Upper Maitai Valley, Graham River, Motupiko, *T. F. C.* Westland—Ahaura Plain, *T. Kirk!* Canterbury—Oxford Forest, *T. Kirk!* Peel Forest, *H. H. Allan!* 1000–4000 ft. December–February.

A distinct species, easily recognized by the tall slender leafy habit, flattened branches, small leaves and flowers, and very small globose drupes.

c. cheesemanii W. Oliv. p. 47

42. **C. depressa** *Col. ex Hook. f. Fl. Nov. Zel.* i (1853) 110.—A small closely branched usually prostrate bush 1–4 ft. high; branches leafy, trailing or prostrate, younger ones puberulous; bark greyish. Leaves usually in opposite fascicles, $\frac{1}{6}$–$\frac{1}{4}$ in. long, $\frac{1}{15}$–$\frac{1}{10}$ in. wide, linear-lanceolate or narrow linear-oblong, rarely linear-obovate, acute or obtuse, narrowed into a rather short petiole or almost sessile, suberect or patent or recurved, rigid and coriaceous, somewhat concave, glabrous or the margins minutely ciliate; veins indistinct. Stipules short, broad, ciliate. Flowers terminating the branchlets, solitary, sessile, involucellate. Male flowers: Calyx wanting. Corolla $\frac{1}{10}$–$\frac{1}{8}$ in. long, campanulate, 4-partite. Female flowers: Calyx-limb 4-toothed. Corolla tubular, $\frac{1}{10}$ in. long, 4-lobed. Drupe $\frac{1}{6}$ in. diam., globose, orange-yellow.—*Handb. N.Z. Fl.* (1864) 118; *Cheesem. in Trans. N.Z. Inst.* xix (1887) 250; *T. Kirk Students' Fl.* (1899) 245; *Cheesem. Man. N.Z. Fl.* (1906) 262. acc. to W.R.B.O. This is not C. depressa Hk f.

North Island: Mount Egmont, *T. F. C.;* Lake Taupo and the Ruahine Mountains, *Colenso! B. C. Aston! Tryon!* Waimarino Plains, Tongariro and Ruapehu, *T. Kirk, T. F. C., Spencer! Cockayne;* Rangipo Desert, *Petrie!* Kaimanawa Mountains, *B. C. Aston!* Mount Holdsworth, *W. Townson!* South Island: Not uncommon in mountainous districts from Nelson and Marlborough to the north of Otago. 2500–5000 ft. December–January.

Closely allied to *C. cuneata*, but a much smaller and more slender plant, with a much more prostrate habit of growth, and with smaller and narrower leaves.

pumila Hkf. Fl. Ant. 2: 1844: 543

43. **C. repens** *Hook. f. Fl. Antarct.* i (1844) 22, t. 16A.—A small glabrous creeping species, often forming broad matted patches. Branches 2–18 in. long or more, prostrate and rooting, stout or slender, sometimes almost flaccid; bark greyish. Leaves usually close-set, rarely distant, $\frac{1}{8}$–$\frac{1}{3}$ in. long, linear-oblong or linear-obovate to broadly oblong or broadly obovate, obtuse or subacute, narrowed into very short broad petioles or almost sessile, bright-green, coriaceous, spreading or suberect; margins thickened. Stipules short and broad, obtuse, glabrous or ciliate. Flowers greenish-white, solitary, terminal. Male flowers: Large for the size of the plant, $\frac{1}{3}$–$\frac{3}{4}$ in. long. Calyx minute, cupular, 4- or 8-toothed. Corolla tubular, often curved, 4–8-toothed or -lobed. Stamens 4–8. Female flowers smaller, $\frac{1}{4}$–$\frac{1}{3}$ in. long. Calyx-limb 4–8-toothed. Corolla tubular, 4–8-lobed to about $\frac{1}{3}$-way down. Styles 2 or 4, rarely 3 or 5. Drupe globose, $\frac{1}{4}$ in. diam., red or orange-yellow.—*Fl. Nov. Zel.* i (1853) 110; *Handb. N.Z. Fl.* (1864) 119; *Cheesem. in Trans. N.Z. Inst.* xix (1887) 250; *T. Kirk Students' Fl.* (1899) 245; *Cheesem. Man. N.Z. Fl.* (1906) 262; *Subantarct. Is. N.Z.* ii (1909) 412; *Rept. Austr. Ant. Exp. Bot.* vii, pt. 3 (1919) 28. C. pumila *Hook. f. Fl. Antarct.* ii (1847) 543; *Fl. Nov. Zel.* i (1853) 110; *Handb. N.Z. Fl.* (1864) 119. C. perpusilla *Col. in Trans. N.Z. Inst.* xxii (1890) 466.

not repens Richard see Obiv p.

North and South Islands, Stewart Island, Auckland and Campbell Islands, Antipodes Island, Macquarie Island: Abundant in mountain districts from the East Cape southwards; ascending to 6000 ft. on Mount Egmont and in the Southern Alps, descending to sea-level in the Auckland Islands, &c. December–January.

Easily distinguished from all other species, except *C. Petriei*, by the small size and creeping and matted habit. From *C. Petriei* it is separated by the larger and broader always glabrous leaves, much longer tubular male flowers, and smaller drupe.

44. **C. Petriei** *Cheesem. in Trans. N.Z. Inst.* xviii (1886) 316.—Stem prostrate and creeping, usually forming broad matted patches; branches 6–18 in. long, glabrous or puberulous. Leaves usually close-set, erecto-patent, $\frac{1}{10}$–$\frac{1}{4}$ in. long, linear-oblong or linear-obovate, acute or obtuse, narrowed into short petioles or sessile, often concave, rigid and coriaceous, veinless, glabrous or sprinkled over with short white hairs on both surfaces. Flowers solitary, terminating short erect branchlets, involucellate. Male flowers: Calyx wanting. Corolla $\frac{1}{5}$–$\frac{1}{3}$ in. long, tubular at the base, campanulate above, 4-lobed. Female flowers smaller, about $\frac{1}{8}$ in. long. Calyx-limb irregularly toothed. Corolla broadly tubular, deeply 4-lobed. Drupe large, globose, $\frac{1}{3}$–$\frac{1}{2}$ in. diam., variable in colour, dark-purple or bluish-purple, sometimes pale and translucent.—*T. Kirk Students' Fl.* (1899) 246; *Cheesem. Man. N.Z. Fl.* (1906) 263.

North Island: Tussock grassland on the volcanic plateau, *Cockayne.* South Island: Abundant in mountain districts throughout. 2500–5500 ft., but descends to sea-level at the mouth of Waitaki River. November–January.

Easily separated from *C. repens* by the shape of the male corolla and much larger drupe.

var. vera C+A.

" atropurpurea C+A. Trans 56: 1926: 22

Druce, 1916: 637 makes N granadensis Comb. nov. ULE
N. depressa, but N. granad. is in America.

2. **NERTERA** Banks and Sol. ex Gaertn 1788

Small slender creeping perennial herbs. Leaves opposite, glabrous or sparsely pilose. Stipules small, interpetiolar. Flowers solitary, axillary or terminal, sessile or very shortly pedicelled, hermaphrodite. Calyx-limb truncate or very obscurely 4-toothed. Corolla tubular or funnel-shaped, 4–5-lobed; lobes valvate. Stamens 4 or 5, inserted at the base of the corolla-tube; filaments long, filiform; anthers large, far-exserted, usually pendulous. Ovary 2-celled; styles 2, filiform, free nearly to the base, hirsute; ovules solitary in each cell. Drupe globose or ovoid, fleshy, containing 2 1-seeded pyrenes.

A small genus of 10 or 11 species, found in Australia and New Zealand, Java, the Philippine Islands, Andine and Antarctic South America, and Tristan d'Acunha.

Perfectly glabrous.	Leaves broad-ovate.	Drupe globose ..	1. *N. depressa.*
Perfectly glabrous.	Leaves broad-ovate.	Drupe pyriform ..	2. *N. Balfouriana.*
Perfectly glabrous.	Leaves narrow-ovate ..	.. ..	3. *N. Cunninghamii.*
Hairy or villous.	Leaves cordate-ovate.	Corolla short, $\frac{1}{8}$ in. long	4. *N. dichondraefolia.*
Hispid.	Leaves ovate or oblong.	Corolla long, $\frac{1}{3}$–$\frac{1}{2}$ in., tubular	5. *N. setulosa.*

1. **N. depressa** *Banks and Sol. ex Gaertn. Fruct.* i (1788) 124, t. 26.—A slender glabrous perennial, very variable in size, often forming broad matted patches; stems 2–12 in. long, creeping and rooting at the nodes. Leaves $\frac{1}{4}$–$\frac{1}{2}$ in. long, broadly ovate or almost orbicular, acute or obtuse, rounded or truncate or almost cordate at the base, quite glabrous; petioles equalling the blade or shorter. Stipules small. Flowers very small and inconspicuous, solitary, terminal, sessile. Calyx-limb truncate or nearly so. Corolla $\frac{1}{10}$ in. long, broadly funnel-shaped, 4-lobed. Drupe globose or broader than long, red.—*Forst. f. Prodr.* (1786) 89; *A. Cunn. Precur.* (1838) n. 481; *Raoul Choix* (1846) 46; *Hook. f. Fl. Antarct.* i (1844) 23; *Fl. Nov. Zel.* i (1853) 112; *Handb. N.Z. Fl.* (1864) 120; *Benth. Fl. Austral.* iii (1866) 431; *T. Kirk Students' Fl.* (1899) 246; *Cheesem. Man. N.Z. Fl.* (1906) 264; *Cheesem. Bot. Subantarct. Is. N.Z.* ii (1909) 412. N. montana *Col. in Trans. N.Z. Inst.* xxviii (1896) 595.

North Island: Ruahine Mountains, *Colenso, B. C. Aston!* Kaimanawa Mountains, *B. C. Aston!* Tararua Mountains, *Petrie;* Cape Turakirae (Cook Strait), *B. C. Aston.* South Island, Stewart Island, Auckland Islands: Abundant throughout, chiefly in mountain districts. Ascends to 4500 ft. October–January.

Also found in Australia and Tasmania, South America, and Tristan d'Acunha. The leaves very rarely have a few sparse hairs on the upper surface.

2. **N. Balfouriana** *Cockayne in Trans. N.Z. Inst.* xliv (1912) (*Proceedings*) 50.—A perfectly glabrous creeping perennial herb, often forming much-branched patches. Leaves broadly oblong or suborbicular, $\frac{1}{8}$–$\frac{1}{6}$ in. long by almost as much in width, rounded or cuneate at the base; petiole $\frac{1}{8}$ in. long, channelled above. Flowers not seen. Drupe pyriform, $\frac{1}{4}$–$\frac{1}{3}$ in. long, orange-red.

South Island: Canterbury—Waimakariri, Rakaia, Ashburton, and Rangitata Valleys, creeping on *Sphagnum* cushions, *Cockayne, R. M. Laing;* Mount Cook district, *Petrie.* 2000–3000 ft.

I have seen no specimens of this, and the above description will doubtless require enlargement when a full suite has been obtained. Dr. Cockayne remarks that the drupes are sometimes produced in such profusion as to quite hide the leaves, the plant thus forming a very beautiful object. This is also the case with *N. depressa.*

See Trans 57: 1926: 71
.. 69: 1939: 275
71: 1941: 94

3. **N. Cunninghamii** *Hook. f. Fl. Nov. Zel.* i (1853) 112.—Perfectly glabrous. Stems much more slender than in *N. depressa*, almost filiform, 4–18 in. long. Leaves $\frac{1}{4}$–$\frac{1}{3}$ in. long, narrow-ovate, acute, rounded at the base; petioles about as long as the blade. Stipules small, acute. Flowers very minute, terminal. Calyx-limb truncate or obsoletely 4-toothed. Corolla shorter and broader than in *N. depressa*, $\frac{1}{12}$ in. long, 4-lobed. Stamens usually erect. Drupe globose, red, $\frac{1}{8}$ in. diam.—*Handb. N.Z. Fl.* (1864) 120; *T. Kirk Students' Fl.* (1899) 247; *Cheesem. Man. N.Z. Fl.* (1906) 264. ? N. papillosa *Col. in Trans. N.Z. Inst.* xxviii (1896) 595.

North Island: From Mangonui and Kaitaia southwards to Cook Strait, but often local. South Island: Nelson—Wangapeka Valley, *F. G. Gibbs!* near Westport, *W. Townson!* October–January.

This differs from the preceding species only in the more slender habit, narrower leaves, and slightly smaller drupe. It is said to occur in the Philippine Islands.

4. **N. dichondraefolia** *Hook. f. Fl. Nov. Zel.* i (1853) 112, t. 28A.—A slender creeping herb, often forming extensive matted patches. Stems 4 in. to 2 ft. long, branched, more or less hairy or villous with soft tawny hairs, rarely nearly glabrous. Leaves with the petioles $\frac{1}{4}$–$\frac{3}{4}$ in. long, broadly ovate or almost orbicular, acute or apiculate, cordate or rounded at the base, membranous, more or less hispid or hairy above, usually glabrous or nearly so beneath; petiole longer or shorter than the blade. Stipules acute. Flowers terminal, sessile. Calyx-limb obscurely 4-toothed. Corolla $\frac{1}{8}$ in. long, funnel-shaped, 4-lobed. Drupe globose, red, $\frac{1}{6}$ in. diam.—*Handb. N.Z. Fl.* (1864) 120; *T. Kirk Students' Fl.* (1899) 247; *Cheesem. Man. N.Z. Fl.* (1906) 265. N. gracilis *Raoul in Ann. Sci. Nat.* ii (1844) 121. N. ciliata *T. Kirk Students' Fl.* (1899) 247. Geophila dichondraefolia *A. Cunn. Precur.* (1838) n. 482.

North and South Islands, Stewart Island: Abundant from Mangonui and Kaitaia southwards. Sea-level to nearly 3000 ft. October–December.

Very variable in size, amount of hairiness, &c. Small specimens are sometimes almost glabrous, while large laxly branched ones are often copiously villous. Mr. Kirk's *N. ciliata*, which he distinguished by the ciliate leaves and shorter petioles, appears to me to be a trivial form only.

5. **N. setulosa** *Hook. f. Fl. Nov. Zel.* i (1853) 112, t. 28B.—Very variable in size, more or less hispid with short stiff hairs. Stems creeping and rooting, 3–12 in. long, putting up numerous leafy suberect branches 1–6 in. high or more. Leaves $\frac{1}{4}$–$\frac{3}{4}$ in., broadly ovate or orbicular to oblong or oblong-obovate, obtuse, membranous, laxly clothed with stiff white hairs; margins ciliate; petiole shorter than the blade. Flowers axillary or terminal, very slender, $\frac{1}{3}$–$\frac{1}{2}$ in. long. Calyx-tube densely hispid; limb unequally 4–5-toothed. Corolla very long, tubular, hispid, 4–5-toothed; teeth erect. Filaments very long, wiry, far-exserted; anthers apiculate, sagittate at the base. Styles long. Drupe usually dry, $\frac{1}{8}$–$\frac{1}{6}$ in. long, oblong, obscurely ribbed, hispid.—*Handb. N.Z. Fl.* (1864) 120; *T. Kirk Students' Fl.* (1899) 247; *Cheesem. Man. N.Z. Fl.* (1906) 265. N. pusilla *Col. in Trans. N.Z. Inst.* xvi (1884) 331.

North Island: Auckland—North Cape district, *Adams* and *T. F. C.*; Kaitaia, *R. H. Matthews!* between Kaihu and Maunganui Bluff, *Petrie! T. F. C.*; Patetere Plateau, *T. F. C.* Hawke's Bay—Dannevirke and Norsewood, *Colenso!* Wellington—

Wairarapa, *Colenso!* near Marton, *W. Townson!* near Wellington, *T. Kirk!* Kapiti Island, *B. C. Aston.* SOUTH ISLAND: Otago—Plentiful, *Petrie! Thomson!* STEWART ISLAND: *T. Kirk!* November–January.

Very distinct from the three preceding species, and at once recognized by the long tubular corolla. The Australian *N. depressa* F. Muell. should probably be united with it. The flowers are strongly proterogynous and possibly dimorphic as well.

3. **GALIUM** Linn.

Herbs with slender quadrangular stems. Leaves in whorls of 4 to 8, of which 2 are supposed to be true leaves and the remainder stipules, although all are precisely similar in size and shape. Flowers minute, in axillary or terminal cymes. Calyx-limb obsolete. Corolla rotate, 4-lobed, rarely 3- or 5-lobed. Stamens 4; filaments short. Ovary 2-celled; styles 2, connate at the base; stigmas capitate; ovules solitary in each cell. Fruit didymous, small, dry, indehiscent.

A large genus of over 220 species, found in all temperate regions. Both the New Zealand species are endemic.

Leaves in whorls of 4, linear-lanceolate .. .. 1. *G. tenuicaule.*
Leaves in whorls of 4, oblong .. .. 2. *G. umbrosum.*

1. **G. tenuicaule** *A. Cunn. Precur.* (1838) n. 468.—Stems slender, straggling, branched, 6 in. to 3 ft. long, glabrous or slightly scabrid on the angles. Leaves in rather distant whorls of 4, $\frac{1}{4}$–$\frac{3}{4}$ in. long, linear-lanceolate or oblong-lanceolate, awned or acuminate, narrowed to the base, scabrid on the margins and midrib beneath. Flowers minute, white, $\frac{1}{12}$ in. diam., in 1–4-flowered axillary cymes; peduncles usually longer than the leaves, decurved in fruit. Fruit of 2 minute globose cocci, dark-brown, glabrous. —*Raoul Choix* (1846) 46; *Hook. f. Fl. Nov. Zel.* i (1853) 113; *Handb. N.Z. Fl.* (1864) 120; *T. Kirk Students' Fl.* (1899) 249; *Cheesem. Man. N.Z. Fl.* (1906) 266. G. triloba *Col. in Trans. N.Z. Inst.* xx (1888) 192.

NORTH AND SOUTH ISLANDS: Damp places on the margins of woods and swamps; not uncommon from Ahipara southwards. Sea-level to 2500 ft. December–March.

2. **G. umbrosum** *Sol. ex Forst. Prodr.* (1786) 89.—Stems 1–10 in. long, suberect or prostrate, much or sparingly branched, weak or rather stiff and wiry, glabrous or more or less ciliate on the angles. Leaves in whorls of 4, $\frac{1}{10}$–$\frac{1}{3}$ in. long, broadly oblong or elliptical oblong, acuminate or mucronate, marked with pellucid dots when held between the eye and the light, glabrous or the margins ciliated, petioles short. Flowers very minute, white; peduncles axillary, longer than the leaves, usually 1-flowered, more rarely 2- or 3-flowered. Fruit of 2 minute globose rugulose cocci.—*Hook. f. Fl. Nov. Zel.* i (1853) 113; *Handb. N.Z. Fl.* (1864) 121; *T. Kirk Students' Fl.* (1899) 249; *Cheesem. Man. N.Z. Fl.* (1906) 266. G. propinquum *A. Cunn. Precur.* (1838) n. 469. G. erythrocaulon *Col. in Trans. N.Z. Inst.* xvi (1884) 332.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: From the North Cape southwards; plentiful. Ascends to 3000 ft. December–March.

The European *G. Aparine* L., a much larger and coarser species than either of the above, with weak straggling or subscandent scabrous stems 2–6 ft. long, and lanceolate leaves in whorls of 6–8, has become thoroughly established in many localities in both Islands.

4. **ASPERULA** Linn. 1735.

Herbs with slender quadrangular stems. Leaves in whorls of 4 to 8, of which 2 are leaves and the remainder stipules, as in *Galium*. Flowers minute, solitary or in axillary or terminal cymes. Calyx-limb wanting. Corolla funnel-shaped, with a distinct limb and 4 spreading lobes. Stamens 4; anthers exserted. Ovary 2-celled; styles 2, more or less connate at the base; stigmas capitate. Fruit didymous, small, dry, indehiscent.

A genus comprising about 80 species, found in the temperate and subtropical regions of the Old World, but not extending to America or South Africa. It only differs from *Galium* in the funnel-shaped corolla. The single New Zealand species is endemic.

1. **A. perpusilla** *Hook. f. Fl. Nov. Zel.* i (1853) 114.—A small slender decumbent perennial. Stems weak, filiform, branched, 1–3 in. high, glabrous. Leaves in whorls of 4, $\frac{1}{15}$–$\frac{1}{10}$ in. long, lanceolate, acuminate, awned, straight or curved, margins usually ciliate. Flowers minute, white, axillary or terminal, solitary, often unisexual; males usually pedicelled; females sessile. Calyx-tube glabrous. Corolla $\frac{1}{12}$ in. diam., campanulate, 4- or rarely 5-partite, tube very short. Styles united below, their tips free, divergent. Fruit of 2 globose minutely granulate cocci.—*Handb. N.Z. Fl.* (1864) 121; *T. Kirk Students' Fl.* (1899) 248; *Cheesem. Man. N.Z. Fl.* (1906) 267. A. aristifera *Col. in Trans. N.Z. Inst.* xxi (1889) 88.

North and South Islands, Stewart Island: Not uncommon from the Lower Waikato southwards, ascending to 3000 ft. November–January.

The corolla-tube is much shorter than is usual in *Asperula*, and the species would almost be better placed in *Galium*.

A. fragrantissima J. B. Armstr. in Trans. N.Z. Inst. xiv (1882) 359 is probably a form of *Galium umbrosum*.

Family XCIX. **CAPRIFOLIACEAE.**

Erect or climbing shrubs or small trees, rarely herbs. Leaves opposite, seldom alternate, simple or rarely pinnate, usually exstipulate. Flowers hermaphrodite, regular or irregular. Calyx-tube adnate to the ovary; limb 3–5-toothed or -lobed. Corolla gamopetalous, epigynous, rotate or funnel-shaped or tubular; limb often irregular or 2-lipped; lobes 4–5, imbricate, rarely valvate. Stamens 4–5, inserted on the tube of the corolla and alternating with its lobes, equal or unequal. Ovary inferior, 2–5-celled (rarely 1-celled), usually crowned with an epigynous disc; style long with a capitate stigma, or short and 2–5-lobed; ovules 1 or more in each cell, pendulous, anatropous. Fruit usually a berry or drupe, rarely a capsule, 1- or many-seeded. Seeds with copious albumen; embryo usually minute, radicle superior.

A small family, comprising 14 genera and about 200 species, mostly natives of the Northern Hemisphere, with few tropical or southern representatives. The family is of little economical importance, but many of the species are cultivated in gardens for the beauty or fragrance of their flowers, as the various kinds of honeysuckles and woodbines, &c. The single New Zealand genus is endemic.

ALSEUOSMIA A. Cunn. 1837

Evergreen shrubs, usually of small size; branchlets slender. Leaves alternate, petioled, entire or toothed, very variable in shape, coriaceous or almost membranous; stipules wanting. Flowers axillary, solitary or fascicled, very sweet-scented; pedicels bracteolate at the base. Calyx-tube ovoid; limb deeply 4–5-lobed, deciduous. Corolla tubular or funnel-shaped; tube long, equal at the base; limb of 4–5 spreading lobes; margin of lobes inflexed, toothed or lobulate. Stamens 4–5, inserted near the mouth of the corolla; filaments short; anthers oblong. Ovary 2-celled; style filiform; stigma clavate; ovules numerous in each cell, in a double row on axile placentas. Berry ovoid or oblong, 2-celled, crimson. Seeds several in each cell, angular; testa bony.

A small genus of four species, confined to New Zealand, and differing from the rest of the family in the alternate leaves. The species are exceedingly variable and difficult of discrimination.

Leaves large, 3–7 in. Flowers 1–1½ in. long, usually 5-merous ..	1. *A. macrophylla.*
Leaves 1–4 in., ovate-oblong to linear-oblong. Flowers ½–¾ in., usually 4-merous	2. *A. quercifolia.*
Leaves ½–2 in., orbicular to obovate-oblong. Flowers ⅓–½ in. ..	3. *A. Banksii.*
Leaves ½–3 in., narrow-linear to lanceolate. Flowers ½–⅔ in. ..	4. *A. linariifolia.*

1. **A. macrophylla** *A. Cunn. Precur.* (1838) n. 494.—A perfectly glabrous much-branched shrub 4–8 ft. high. Leaves 3–7 in. long, obovate or obovate-lanceolate to linear-oblong, obtuse or subacute, narrowed into a short stout petiole, remotely sinuate-dentate or nearly entire, rather coriaceous. Flowers solitary or in fascicles of 2–4, large, 1–1½ in. long, bright-crimson. Calyx-lobes lanceolate, acute. Corolla-lobes 5, rarely 4, margins fimbriate or toothed. Berry oblong, crimson, ⅓–½ in. long.—*Raoul Choix* (1846) 46; *Hook. f. Fl. Nov. Zel.* i (1853) 102, t. 23; *Handb. N.Z. Fl.* (1864) 109; *T. Kirk Students' Fl.* (1899) 227; *Cheesem. Man. N.Z. Fl.* (1906) 240; *Ill. N.Z. Fl.* ii (1914) t. 78.

North Island: Abundant in woods from the North Cape to the East Cape, rare and local farther south. South Island: Apparently very rare. Marlborough, *J. Rutland!* Collingwood, *Dall!* Kelly's Creek, Westland, *Cockayne!* Sea-level to 3200 ft. September–November.

A very beautiful and exceedingly fragrant plant, well worthy of general cultivation. It is easily distinguished from all the other species by the large flowers.

2. **A. quercifolia** *A. Cunn. Precur.* (1838) n. 493.—A small slender sparingly branched shrub 1–5 ft. high. Leaves excessively variable in size and shape, 1–5 in. long, ovate-oblong, elliptic-oblong, obovate-lanceolate, or linear-oblong, obtuse or acute, narrowed into a short slender petiole, entire or sinuate-dentate or deeply sinuate-lobed, almost membranous, sometimes glaucous below. Flowers solitary or in fascicles of 2–5, ½–¾ in. long, very slender. Calyx-lobes triangular, acute. Corolla with a crimson tube and 4–5 greenish or reddish-green acute lobes. Berry ⅓–½ in. diam., broadly oblong, red.—*Raoul Choix* (1846) 46; *Hook. f. Fl. Nov. Zel.* i (1853) 102; *Handb. N.Z. Fl.* (1864) 109; *T. Kirk Students' Fl.* (1899) 227; *Cheesem. Man. N.Z. Fl.* (1906) 240. A. ilex *A. Cunn. Precur.* (1838) n. 492. A. pusilla *Col. in Trans. N.Z. Inst.* xvii (1885) 241.

North Island: From Mangonui and Kaitaia southwards, but often local. South Island: Marlborough—Rai Valley, *J. Rutland*; Pelorus Sound, *J. H. Macmahon*; Mount Stokes, *T. Kirk*. Sea-level to 2500 ft. September–November.

A very variable plant, which in some of its forms comes very near to both *A. Banksii* and *A. linariifolia*. Mr. Colenso's *A. pusilla* only differs in its rather smaller size.

3. **A. Banksii** *A. Cunn. Precur.* (1838) n. 489.—A small slender shrub 1–4 ft. high; branches spreading, younger ones pubescent. Leaves ½–2 in. long, very variable in shape, broadly ovate or orbicular to obovate-oblong or obcuneate, narrowed into a rather long petiole, entire or coarsely toothed or lobed, especially towards the upper part of the leaf. Flowers solitary or 2–3 together, ⅓–½ in. long, greenish-yellow, rarely reddish. Berry ⅓ in. diam., globose; seeds few, 4–8.—*Raoul Choix* (1846) 46; *Hook. f. Fl. Nov. Zel.* i (1853) 102, t. 24; *Handb. N.Z. Fl.* (1864) 110; *T. Kirk Students' Fl.* (1899) 227; *Cheesem. Man. N.Z. Fl.* (1906) 241. A. palaeiformis *and* A. atriplicifolia *A. Cunn. Precur.* (1838) n. 490, 491.

North Island: From Mangonui and Kaitaia southwards to the Auckland Isthmus, but often rare and local. September–November.

4. **A. linariifolia** *A. Cunn. Precur.* (1838) n. 487.—An erect much-branched shrub 1–4 ft. high, with slender pubescent branches. Leaves numerous, crowded, ½–3 in. long, $\frac{1}{16}$–½ in. wide, linear to linear-lanceolate or lanceolate, acute or subacute, gradually narrowed into a short petiole, quite entire or sinuate-toothed or lobed, rather membranous. Flowers solitary or in fascicles of 2–5, ½–⅔ in. long, greenish-yellow, rarely reddish. Corolla-lobes 4, toothed and fimbriate. Berry broadly ovoid or turbinate; seeds few.—*Raoul Choix* (1846) 46; *Hook. f. Fl. Nov. Zel.* i (1853) 103, t. 25; *Handb. N.Z. Fl.* (1864) 110; *T. Kirk Students' Fl.* (1899) 227; *Cheesem. Man. N.Z. Fl.* (1906) 241. A. ligustrifolia *A. Cunn. Precur.* (1838) n. 488. A. Hookeria *Col. in Tasm. Journ. Nat. Sci.* ii (1846) 297.

North Island: From Mangonui and Kaitaia southwards to the Manukau Harbour, not uncommon. September–November.

A very variable plant. Small forms, with narrow-linear leaves, have much of the habit and appearance of *Pittosporum reflexum*; larger states (*A. ligustrifolia* A. Cunn.), with lanceolate or oblong-lanceolate leaves, approach *A. quercifolia* very closely.

Family C. CUCURBITACEAE.

Climbing or prostrate herbs. Leaves alternate, exstipulate, usually palmately veined or lobed. Tendrils generally present, springing from the sides of the stem near the petioles, simple or divided. Flowers monoecious or dioecious, solitary or in racemes or panicles. Calyx-tube adnate to the ovary; limb campanulate or rotate or tubular, 3–5-lobed; lobes imbricate. Petals 3–5, inserted on the calyx-limb, free or united into a lobed corolla, often confluent with the calyx below. Stamens 3 or 5, inserted on the calyx-tube; filaments free or connate into a tube or column; anthers free or united, one 1-celled, the others 2-celled; cells often long and sinuous. Ovary inferior, usually 1-celled when very young, with 3 (rarely 4–5) parietal placentas, which thicken and turn inwards, meeting in the axis, so that the ovary becomes spuriously 3–6-celled; style simple, entire or 3-fid; ovules 1 or more to each placenta. Fruit succulent or coriaceous, indehiscent or bursting irregularly. Seeds usually many, generally flat; albumen wanting; embryo straight, cotyledons large.

A natural and well-defined family, spread over the tropics and warmer portions of the temperate zones, nearly absent in cold climates. Genera about 85; species nearly 700. The family is mainly important on account of the edible fruits which many species produce, as the pumpkin, melon, water-melon, cucumber, &c. Others are acrid and purgative, as colocynth and bryony, and are used in medicine. The common gourd (*Lagenaria vulgaris*), the hard-rinded fruit of which is so extensively used in the tropics for water-vessels, &c., was introduced into New Zealand by the Maoris, and cultivated by them long before the advent of Europeans, but is now seldom seen. The sole indigenous genus (*Sicyos*) occurs in America, the Pacific islands, and Australasia.

SICYOS Linn. 1735.

Climbing or prostrate herbs. Leaves angular or 3–5-lobed. Flowers small, monoecious. Male flowers racemose. Calyx-tube broadly campanulate, 5-toothed. Corolla rotate, deeply 5-partite. Stamens connate into a short column; anthers 2–5, sessile at the top of the column, sinuous; cells confluent. Female flowers capitate on a short peduncle, rarely solitary. Calyx-tube adnate with the ovary; limb and corolla as in the male flowers. Ovary 1-celled; style short, 3-fid; ovule solitary, pendulous. Fruit small, coriaceous, dry, indehiscent, covered with barbed spines.

A small genus of about 30 species, mainly from tropical America, but extending to Australia and the Pacific islands. The single New Zealand species has the range of the genus.

1. **S. angulata** *Linn. Sp. Plant.* (1753) 1013. — Stems trailing or climbing, usually from 2 to 10 ft. long but sometimes much more, glabrous or more or less scabrid. Leaves on long petioles, 2–6 in. diam. or more, ovate-cordate to reniform, palmately 5–7-lobed, the central lobe the longest, membranous, scabrid with short stiff hairs or almost glabrous; tendrils very long, branched. Flowers $\frac{1}{3}$ in. diam., greenish; males racemose on a long peduncle; females often from the same axil, capitate on a short peduncle. Fruits clustered, $\frac{1}{2}$ in. long, ovoid, compressed, densely covered with barbed spines.—*Forst. f. Prodr.* (1786) 68; *A. Rich. Fl. Nouv. Zel.* (1832) 323; *Hook. f. Fl. Nov. Zel.* i (1853) 72; *Handb. N.Z. Fl.* (1864) 82; *Benth. Fl. Austral.* iii (1866) 322; *T. Kirk Students' Fl.* (1899) 183; *Cheesem. Man. N.Z. Fl.* (1906) 190. S. australis *Endl. Prodr. Fl. Norf.* (1833) 67; *A. Cunn. Precur.* (1838) n. 525.

Kermadec Islands: Abundant, attaining a large size, *McGillivray, T. F. C.* North Island: In various places on the coast, as far south as Hawke's Bay; more plentiful on the outlying islands than on the mainland. South Island: Queen Charlotte Sound, *Banks* and *Solander. Mawhai.* November–March. Also in North and South America, Australia, Norfolk Island, Lord Howe Island, and Polynesia.

Family CI. CAMPANULACEAE.

Herbs or shrubs, usually with milky juice. Leaves alternate, seldom opposite, entire or toothed, rarely lobed or dissected; stipules wanting. Flowers hermaphrodite, rarely unisexual, regular or irregular. Calyx-tube adnate to the ovary; limb 4–6- usually 5-lobed. Corolla gamopetalous, epigynous, regular or irregular and split to the base at the back, 4–6-lobed; lobes valvate, often induplicate. Stamens as many as the corolla-lobes and alternate with them, epigynous or more rarely inserted on the tube of the corolla; anthers free or united into a tube. Ovary

inferior, rarely semi-superior, 2–5-celled; style single; stigmatic lobes as many as cells to the ovary; ovules numerous, anatropous, placentas in the inner angles of the cells. Fruit a capsule or berry. Seeds numerous, small; albumen fleshy; embryo straight, axile; radicle next the hilum.

A large family, perhaps most abundant in the temperate regions of the Northern Hemisphere, but extending through the tropics, plentiful in South Africa, and present in fair numbers in other portions of the South Temperate Zone. Genera 55; species about 1000. As a whole, the family is characterized by the presence of acrid and poisonous qualities, and many of the species are highly dangerous. Few possess any economic importance, but many kinds of *Campanula* and *Lobelia* are cultivated in gardens for the beauty of their flowers. Of the New Zealand genera, *Lobelia* and *Wahlenbergia* are widely distributed; *Pratia* is confined to the South Temperate Zone; *Isotoma* is chiefly Australian; while *Colensoa* is endemic.

Tribe 1. LOBELIEAE. Lobeliaceae

Corolla irregular, 2-lipped. Anthers cohering.

Tall herb. Flowers in racemes. Fruit an indehiscent berry ..	1. Colensoa.
Creeping herbs. Flowers solitary, axillary. Fruit an indehiscent berry	2. Pratia.
Herbs. Corolla split to the base at the back. Stamens free from the corolla-tube. Fruit a capsule, 2-valved at the tip ..	3. Lobelia.
Herbs. Corolla not split to the base; stamens affixed to the tube. Fruit a capsule, 2-valved at the tip	4. Isotoma.

Tribe 2. CAMPANULEAE. Campanulaceae

Corolla regular. Anthers free.

Herbs. Corolla campanulate. Capsule 2–3-valved at the tip ..	5. Wahlenbergia.

1. **COLENSOA** Hook. f. 1835

A tall erect leafy herb, often woody at the base. Leaves large, alternate, doubly serrate. Flowers large, in terminal racemes. Calyx-tube adnate to the ovary, limb 5-partite. Corolla oblique, curved, split to the base at the back, 2-lipped; upper lip of 2 linear acute lobes, lower of 3 oblong spreading ones. Stamens exserted; filaments pubescent, free for the greater part of their length; anthers cohering into a tube, pilose on the connective and at the tips. Ovary inferior, 2-celled; ovules numerous, attached to broad peltate placentas; style long; stigma 2-lobed, lobes large, oblong, spreading. Berry globose, thinly fleshy, crowned by the persistent calyx-lobes, indehiscent. Seeds numerous, subglobose, tuberculate.

A genus of a single species, endemic in the northern portion of the North Island. It is very closely allied to *Pratia*, differing chiefly in the tall erect habit, in the racemose inflorescence, and in the large stigmatic lobes.

1. **C. physaloides** *Hook. f. Fl. Nov. Zel.* i (1853) 157.—Stem flexuose, smooth, sparingly branched, 1–4 ft. high. Leaves on slender petioles 2–5 in. long; blade 3–7 in. long, ovate, acute, unequally doubly serrate, thin and membranous, conspicuously veined, glabrous or with a few sparse soft hairs. Racemes terminal, 5–15-flowered, shorter than the leaves; pedicels slender, bracteolate at the base. Corolla 1½–2 in. long, pale-blue, pubescent. Berry ½ in. diam., bluish, coriaceous.—*Handb. N.Z. Fl.* (1864) 170; *Bot. Mag.* (1886) t. 6864; *Cheesem. Man. N.Z. Fl.* (1906) 397. Pratia physaloides *Hemsl. in Hook. Ic. Plant.* (1886) sub. t. 1532. Lobelia physaloides *A. Cunn. Precur.* (1838) n. 425; *Raoul Choix* (1846) 45; *Hook. Ic. Plant.* (1843) tt. 555, 556. Illus. Ic. t. 119

A. Cunn. in Tayl. Ann. Nat. Hist. 2: 50.
D.C. Prodr. v. 7. add. p. 485.
(Hook. Ic. Plant. tab. 555–556).

Pratia Gaud in Freyc. Voy. 4.:458 : 1826. P. repens.

NORTH ISLAND: From the Three Kings Islands and the North Cape southwards to the Bay of Islands, not common, *A. Cunningham, Colenso!* &c.; Sail Rock (off Whangarei Harbour), *Miss Shakespear!* *Oru.* December–March.

In my "Illustrations of the New Zealand Flora" I followed Mr. Hemsley in reducing the genus *Colensoa* to *Pratia*. But, taking into account its much greater size and erect habit, the racemose inflorescence and larger flowers, and much larger stigmatic lobes, I now think that the genus might well be retained, although its close relationship to *Pratia* must be admitted.

2. **PRATIA** Gaud. 1826

Slender prostrate or creeping herbs, rarely ascending or erect. Leaves alternate, toothed. Peduncles axillary, 1-flowered. Flowers rather small, often unisexual. Calyx-tube adnate to the ovary, limb 5-partite. Corolla oblique, split to the base at the back, 2-lipped; upper lip 2-partite, lower lip 3-lobed, spreading. Staminal tube free from the corolla or nearly so; anthers cohering, 2 lower tipped with short bristles, 3 upper naked. Ovary 2-celled; ovules numerous; stigma 2-lobed or emarginate. Berry globose or obovoid, crowned by the persistent calyx-lobes, indehiscent. Seeds numerous, minute.

A small genus of 16 or 18 species, having its headquarters in Australia, but extending northwards to the Himalaya Mountains and eastwards to New Zealand and temperate South America. It only differs from *Lobelia* in the indehiscent more or less succulent fruit.

Stems 4–10 in. long. Leaves $\frac{1}{2}$–1 in. diam., almost sessile. Peduncles usually shorter than the leaves .. .. 1. *P. arenaria.*
Stems 2–6 in. long. Leaves $\frac{1}{6}$–$\frac{1}{2}$ in. long, usually exceeding the leaves .. .. 2. *P. angulata.*
Stems short, densely matted. Leaves $\frac{1}{12}$–$\frac{1}{10}$ in., oblong, deeply toothed .. .. 3. *P. perpusilla.*
Stems stout, matted. Leaves $\frac{1}{6}$–$\frac{1}{3}$ in., coarsely sharply toothed, coriaceous. Corolla-tube cylindrical, swollen below .. .. 4. *P. macrodon.*

1. **P. arenaria** *Hook. f. Fl. Antarct.* i (1844) 41, t. 29.—Stems elongate, creeping and rooting, 4–12 in. long, somewhat fleshy, sparingly branched; branches divaricating, terete, glabrous. Leaves distant, $\frac{1}{2}$–1 in. long, $\frac{1}{3}$–$\frac{3}{4}$ in. broad, broadly oblong-orbicular or obovate-orbicular, suddenly contracted at the base into a very short petiole or almost sessile; margins sinuate-dentate or undulate; veins finely reticulate. Peduncles slender, usually much shorter than the leaves. Flowers $\frac{1}{2}$ in. long. Calyx-tube oblong; limb unequally 5-lobed. Corolla deeply 5-lobed; the 3 lower lobes spreading, the 2 upper ascending. Berry obliquely ovoid-globose, $\frac{1}{3}$–$\frac{1}{2}$ in. long, reddish-purple.—*Cheesem. in Subantarct. Is. N.Z.* ii (1909) 410. P. angulata *var.* arenaria *Hook. f. Fl. Nov. Zel.* i (1853) 157; *Cheesem. Man. N.Z. Fl.* (1906) 398.

SOUTH ISLAND: Catlin's River and other localities in the south-east of Otago, *Petrie!* CHATHAM ISLANDS: *Cockayne, F. A. D. Cox!* AUCKLAND ISLANDS: Enderby Island, *Lieutenant Oakely, Cockayne, B. C. Aston.* CAMPBELL ISLAND: *R. M. Laing!* ANTIPODES ISLAND: *T. Kirk! Cockayne!*

This differs from all the forms of *P. angulata* in the peculiar habit, larger and very obscurely toothed and nearly sessile leaves, and in the shorter peduncles.

2. **P. angulata** *Hook. f. Fl. Antarct.* i (1844) 43.—A very variable slender creeping and rooting perennial herb, often forming broad matted patches, glabrous or slightly pubescent; stems 2–7 in. long; branches often ascending at the tips. Leaves shortly petiolate, $\frac{1}{6}$–$\frac{1}{2}$ in. long, ovate-oblong to orbicular

or obovate, obtusely sinuate-dentate, membranous or rather fleshy. Peduncles variable in length, but usually longer than the leaves, slender, erect. Flowers $\frac{1}{3}$–$\frac{2}{3}$ in. long, white with purple streaks. Calyx-tube oblong, narrow-triangular. Corolla-tube short, the 3 lower lobes spreading, the 2 upper rather smaller and narrower, ascending. Anthers glabrous, the 2 lower ones tipped with minute bristles. Berry globose or broadly ovoid, $\frac{1}{3}$–$\frac{1}{2}$ in. diam., purplish-red. Seeds numerous.—*Fl. Nov. Zel.* i (1853) 157; *Handb. N.Z. Fl.* (1864) 172; *Cheesem. Man. N.Z. Fl.* (1906) 397. Lobelia angulata *Forst. f. Prodr.* (1786) 58; *A. Rich. Fl. Nouv. Zel.* (1832) 227; *A. Cunn. Precur.* (1838) n. 422; *Raoul Choix* (1846) 45. L. littoralis *R. Cunn. ex A. Cunn. Precur.* (1838) n. 423. L. rugulosa *R. Graham in Edinb. N. Phil. Journ.* (Oct.–Dec., 1829) 186.

North and South Islands, Stewart Island: Common in damp situations throughout, ascending to 4500 ft. November–February.

The commonest species of the genus in New Zealand, almost universally distributed in moist sheltered situations.

3. **P. perpusilla** *Hook. f. Handb. N.Z. Fl.* (1864) 172.—A minute creeping and rooting perennial herb, forming matted patches 1–4 in. diam.; stems branched, wiry, stout for the size of the plant. Leaves minute, sessile or nearly so, $\frac{1}{12}$–$\frac{1}{10}$ in. long, oblong or oblong-ovate, obtuse or acute, deeply toothed, rather thick and fleshy, wrinkled or pitted when dry, glabrous or more or less clothed with short bristly hairs. Flowers $\frac{1}{4}$ in. long, on short axillary peduncles or almost sessile. Calyx-tube short, usually hairy; lobes subulate-lanceolate, recurved. Corolla-lobes narrow, almost equal, acute, the 2 upper ones ascending. Anthers glabrous or with a few scattered hairs on the back, the 2 lower tipped with a minute bristle. Fruit not seen.—*Cheesem. Man. N.Z. Fl.* (1906) 398. Lobelia perpusilla *Hook. f. Fl. Nov. Zel.* i (1853) 158.

North Island: Auckland—Lower Waikato, *H. Carse!* Lake Whangape, *T. F. C.*; outlet of Lake Taupo, *Petrie! T. F. C.*; near Te Aroha, *P. H. Allen!* Lake Waikaremoana, *A. Hamilton!* Hawke's Bay—*Colenso!* Taranaki—Near Opunake, *T. Kirk!* Wellington—From Rangitikei to Turakina Rivers, *Cockayne.* South Island: Marlborough—Outlet of Wairau River, *J. H. Macmahon!* Otago—Wycliffe Bay, near Dunedin, *B. C. Aston!* Sea-level to 2000 ft. January–March.

Probably not uncommon, but easily overlooked. I have seen no specimens from the South Island. In the absence of fruit it is impossible to be certain of the genus, but the habit is more that of *Pratia* than of *Lobelia*.

4. **P. macrodon** *Hook. f. Handb. N.Z. Fl.* (1864) 172.—A small perfectly glabrous rather fleshy creeping and rooting perennial herb; stems stout, branched, 1–4 in. long, often forming matted patches. Leaves very shortly petioled or almost sessile, $\frac{1}{5}$–$\frac{1}{3}$ in. long, broadly obovate or orbicular or broader than long, cuneate at the base, deeply and coarsely 4–8-toothed, thick and coriaceous, quite glabrous. Flowers on very short axillary peduncles or almost sessile, large, $\frac{1}{2}$–$\frac{3}{4}$ in. long, pale-yellow, sweet-scented. Calyx-tube broadly turbinate; lobes narrow-triangular. Corolla $\frac{1}{3}$–$\frac{1}{2}$ in. long; tube very long, cylindrical, swollen at the base; lobes short, spreading or recurved. Anthers glabrous, the 2 lower each tipped with a flat rigid bristle with some smaller ones at its base. Berry globose, $\frac{1}{4}$–$\frac{1}{3}$ in. diam. Seeds very numerous, minute.—*Cheesem. Man. N.Z. Fl.* (1906) 398.

South Island: Nelson—Gordon's Knob, Raglan Mountains, Wairau Gorge, *T. F. C.*; Acheron and Clarence Valleys, *W. T. L. Travers*; Mount Murchison, *W. Townson!* Mount Percival, *T. F. C.*; Lake Tennyson, *R. M. Laing!* Canterbury—Mount Oxford, *Cockayne*; Mount Torlesse, *Haast! J. D. Enys! Petrie! T. F. C.*; mountains at the head of the Broken River, *J. D. Enys, T. F. C.*; Arthur's Pass and Waimakariri Glacier, *T. Kirk! T. F. C.*; Mount Arrowsmith, *Cockayne* and *R. M. Laing!* Otago—Mount Cardrona and the Hector Mountains, *Petrie!* Clinton Valley, *Cockayne*. 3000–5500 ft. December–February.

A very distinct species, at once recognized by the long cylindrical corolla-tube.

3. **LOBELIA** Linn.

Herbs of very various habit, or (in species not found in New Zealand) rarely shrubs. Leaves alternate, toothed, seldom entire. Flowers axillary and solitary, or in terminal racemes. Calyx-tube adnate to the ovary; limb 5-partite. Corolla oblique, split to the base at the back, 2-lipped; upper lip 2-partite, usually erect, lower 3-lobed, spreading. Staminal tube free from the corolla or rarely adnate to it at the very base; anthers connate, all or the 2 lower only tipped with bristles. Ovary 2-celled; ovules numerous; style filiform; stigma shortly bifid, often surrounded by a ring of hairs. Capsule 2-celled, opening loculicidally within the calyx-lobes into 2 valves. Seeds usually numerous, minute.

A large genus of over 200 species, rare in Europe and western Asia, abundant in most other regions except the very coldest.

Stems 6–18 in., erect or decumbent. Leaves linear to obovate. Capsule linear-clavate.	1. *L. anceps.*
Stems 1–6 in., creeping and rooting. Leaves $\frac{1}{6}$–$\frac{1}{4}$ in., obovate to orbicular, sinuate-dentate. Capsule oblong-obovoid	2. *L. linnaeoides.*
Stems 2–5 in., tortuous among shingle. Leaves $\frac{1}{2}$–1 in., orbicular-obovate, deeply toothed or lobed. Capsule large, broadly ovoid ..	3. *L. Roughii.*

1. **L. anceps** *Linn. f. Suppl.* (1781) 395.—An erect or decumbent much or sparingly branched leafy herb, everywhere perfectly glabrous. Stems 6–18 in. long, flattened or angular or trigonous, sometimes winged. Leaves very variable in shape and size, 1–3 in. long, the lower ones usually linear-obovate or obovate, gradually narrowed into decurrent petioles, the upper lanceolate or ligulate, gradually passing into the floral leaves, which are smaller, sessile and linear, all sparingly toothed or nearly entire. Flowers small, on short axillary peduncles. Calyx-tube cylindrical, much longer than the short triangular lobes. Corolla pale-blue, $\frac{1}{4}$ in. long. Capsule elongated, $\frac{1}{3}$–$\frac{1}{2}$ in. long, linear-clavate.—*Hook. f. Fl. Nov. Zel.* i (1853) 158; *Handb. N.Z. Fl.* (1864) 171; *Benth. Fl. Austral.* iv (1869) 128; *Cheesem. Man. N.Z. Fl.* (1906) 399. L. alata *Lab. Pl. Nov. Holl.* i (1804) 51, t. 72; *A. Rich. Fl. Nouv. Zel.* (1832) 227; *A. Cunn. Precur.* (1838) n. 421; *Raoul Choix* (1846) 44.

Kermadec Islands, North and South Islands, Chatham Islands: Common in lowland districts as far south as Oamaru and Okarito. November–March.

A very variable plant. Maritime specimens usually have larger, broader, and more succulent leaves than those found inland, and often present a very distinct appearance.

2. **L. linnaeoides** *Petrie in Trans. N.Z. Inst.* xxiii (1891) 405.—A small creeping and rooting perennial herb; stems slender, glabrous, sparingly branched, 1–6 in. long. Leaves very shortly petiolate or almost sessile, $\frac{1}{6}$–$\frac{1}{4}$ in. diam., orbicular or ovate-orbicular, coarsely sinuate-dentate,

rather thick and coriaceous, often purplish beneath, glabrous or with minute bristly hairs above. Peduncles slender, erect, axillary, 1-flowered, 1½–2½ in. long. Flowers ⅓–½ in. long. Calyx-lobes small, narrow-triangular, $\frac{1}{12}$ in. long. Corolla ⅓ in. long, the lower lobes obovate, apiculate; the upper narrower, linear-oblong, acute. Anthers glabrous, the 2 lower ones tipped with minute flat bristles. Capsule ¼–⅓ in. long, narrow obovoid-oblong, straight. Seeds small, smooth.—*Cheesem. Man. N.Z. Fl.* (1906) 400. Pratia (?) linnaeoides *Hook. f. Handb. N.Z. Fl.* (1864) 172.

South Island: Canterbury — Ashburton Mountains, *T. H. Potts!* Macaulay River, *Haast;* Lake Ohau, *Buchanan!* Otago—Lindis Pass, *Hector* and *Buchanan;* Mount Cardrona, Mount Pisa, Hector Mountains, Mount Tyndall, Mount Bonpland, &c., *Petrie!* 2500–4500 ft. December–February.

3. **L. Roughii** *Hook. f. Handb. N.Z. Fl.* (1864) 171.—A small perfectly glabrous perennial herb 2–5 in. high, full of white acrid fluid. Stems very slender, creeping, branched, tortuous among shingle; branches short, leafy at the tips. Leaves alternate, ½–1 in. long; blade broadly oblong or obovate to orbicular, narrowed into a broad flat petiole, coarsely and deeply toothed or lobed with a rounded sinus between the teeth, thick and coriaceous; main veins 5–7, spreading from the base of the leaf. Peduncles stout, erect, axillary, 1-flowered; at first shorter than the leaves, but lengthening as the fruit ripens, and sometimes reaching 2 in. or more. Flowers ½ in. long. Calyx globose; lobes linear, obtuse, coriaceous, lengthening as the fruit ripens. Corolla equalling the calyx-lobes, 3-lipped; the two dorsal petals (upper lip) being free from one another to the base; lower lip 3-lobed about ⅓-way down. Anthers glabrous. Capsule ⅓–½ in. long, broadly ovoid, coriaceous. Seeds very numerous.—*Buch. in Trans. N.Z. Inst.* xiv (1882) 347, t. 28, f. 1; *Cheesem. Man. N.Z. Fl.* (1906) 400; *Ill. N.Z. Fl.* i (1914) t. 120B.

South Island: Shingle-slopes on the mountains, not common. Nelson—Dun Mountain, *Rough;* Wairau Gorge, *W. T. L. Travers, T. F. C.;* Mount Peel, *F. G. Gibbs! T. F. C.;* Mount Percival, *T. F. C.;* Lake Tennyson, *R. M. Laing!* Marlborough —Awatere Valley, *Cockayne.* Canterbury—Mount Torlesse, *J. F. Armstrong! T. F. C.;* mountains above the Broken River, *J. D. Enys!* Mount Arrowsmith, *Cockayne* and *R. M. Laing;* Mount Dobson, *T. F. C.;* Lake Ohau, *Buchanan!* Otago—Mount Ida, Mount St. Bathan's, Mount Kyeburn, *Petrie!* 3000–6000 ft. December–March.

A most distinct species, quite unlike any other. It is remarkable for the corolla being twice split to the base at the back, so that the flower is 3-lipped.

4. **ISOTOMA** Lindl.

Herbs of various habit. Leaves alternate, entire or toothed or pinnatifid. Flowers axillary or in terminal racemes. Calyx-tube adnate to the ovary; limb 5-partite. Corolla-tube cylindrical, entire or very shortly slit on the upper side; limb spreading, with 5 nearly equal lobes. Stamens inserted about the middle of the corolla-tube; filaments connate above; anthers similar to those of *Lobelia*, the 2 lower ones tipped with one or several short bristles, the 3 upper naked. Ovary 2-celled; ovules numerous; stigma shortly 2-lobed. Capsule 2-celled, loculicidally 2-valved within the calyx-lobes. Seeds numerous.

A small genus of 6 or 8 species, most of them natives of Australia. It differs from *Lobelia* in the corolla-tube not being split to the base at the back, and in the stamens being affixed to the middle of the tube. The single species found in New Zealand is plentiful in south-east Australia and Tasmania.

1. **I. fluviatilis** *F. Muell. ex Benth. Fl. Austral.* iv (1869) 136.—A small slender creeping and rooting perennial herb, often forming matted patches, glabrous or slightly pubescent; stems 1–4 in. long. Leaves shortly petiolate, $\frac{1}{4}$–$\frac{1}{3}$ in. long, oblong or obovate-oblong to linear-oblong, obtuse or subacute, entire or sinuate-dentate, rather thin and membranous. Peduncles axillary, 1-flowered, longer than the leaves. Flowers pale-blue, $\frac{1}{4}$–$\frac{1}{3}$ in. long. Calyx-lobes subulate-lanceolate. Corolla-tube not split at the back, longer than the calyx-lobes; lobes linear-oblong, spreading. Stamens attached to the corolla-tube about the middle; the 2 lower anthers each tipped with a rigid bristle. Capsule oblong, $\frac{1}{5}$ in. long. Seeds smooth.—*Cheesem. Man. N.Z. Fl.* (1906) 401. Lobelia fluviatilis *R. Br. Prodr.* (1810) 563; *Hook. f. Fl. Tasm.* i (1860) 238, t. 70.

South Island: Nelson—Lower portion of the Buller Valley and marshy places near Westport, *W. Townson!* Mokohinou River, *Spencer!* Canterbury—Broken River basin, *J. D. Enys! T. Kirk! T. F. C.;* Mount Torlesse, *Cockayne;* Lake Tekapo, *T. F. C.* Otago—Macrae's, *Petrie!* Lake Hauroko, *J. Crosby Smith.* Sea-level to 3000 ft. December–February.

Probably an abundant mountain-plant. In the absence of fruit it has been for many years confused with small forms of *Pratia angulata*, both in my own herbarium and in Kirk's and Petrie's, although the entire corolla-tube and epicorolline stamens ought to have been sufficient to indicate its proper position.

5. **WAHLENBERGIA** Schrad.

Annual or perennial herbs. Leaves alternate or rarely opposite. Peduncles terminal or axillary, often forming leafy panicles. Flowers usually blue or white. Calyx-tube adnate to the ovary; limb 5-partite, rarely 3–4- or 6–7-partite. Corolla regular, campanulate or more or less tubular at the base; lobes as many as the divisions of the calyx, valvate. Stamens free from the corolla; filaments often dilated at the base; anthers oblong, free. Ovary 2–5-celled; ovules numerous; style cylindric; stigma 2–5-fid. Capsule 2–5-celled, opening loculicidally within the calyx-lobes with 2–5 valves. Seeds numerous, small.

A large genus of about 85 species, most numerous in South Africa, but not uncommon in other parts of the Southern Hemisphere; rare in the tropics or in the North Temperate Zone.

According to Mr. N. E. Brown ("Gardeners' Chronicle," vol. 54, pp. 316, 336, 354) the nomenclature of the Australian and New Zealand species of *Wahlenbergia* is in a remarkable state of confusion. For instance, Mr. Brown finds "that the description of *W. gracilis* covers a mixture of at least half a dozen perfectly distinct species." "This confusion was begun by Robert Brown, who in his 'Prodromus Florae Novae-Hollandiae,' p. 561, placed four distinct plants as varieties of *Campanula gracilis*." Subsequent authors have mostly followed Robert Brown, and the confusion once established increased as years went on. With respect to the New Zealand species included in Hooker's Handbook—*W. gracilis*, *W. saxicola*, and *W. cartilaginea*—Mr. N. E. Brown remarks "that of these *W. cartilaginea* is the only one correctly dealt with." The description of *W. gracilis* obviously includes a mixture of species; while the real *W. saxicola* does not occur in New Zealand at all, being strictly confined to Tasmania; our plant being *W. albomarginata*.

Mr. N. E. Brown, in a highly informative memoir, then proceeds to give new and correct descriptions of most of those species that have been treated in too discursive a manner, and also describes two new species. New Zealand botanists will find much of value in his memoir, which they should consult when working at the genus. I have pleasure in acknowledging my own indebtedness for information derived while preparing the following account of the New Zealand species.

Of the 8 species admitted in the following account, *W. gracilis* is usually supposed to extend to Australia and New Caledonia; *W. vincaefolia* is probably more plentiful in Australia than in New Zealand; while the remaining 6 are apparently confined to New Zealand.

Annual, usually branched, 6–18 in. Leaves never rosulate, $\frac{1}{2}$–$1\frac{1}{2}$ in. × $\frac{1}{12}$–$\frac{1}{4}$ in., linear-spathulate to linear-obovate. Flowers small, $\frac{1}{5}$–$\frac{1}{2}$ in. long	1. *W. gracilis.*
Small slender annual $1\frac{1}{2}$–6 in. high, simple or branched. Stems with spreading hairs at base. Leaves $\frac{1}{12}$–$\frac{9}{12}$ in. long. Flowers very small, $\frac{1}{12}$–$\frac{1}{8}$ in. long	2. *W. Colensoi.*
Stems 9–18 in. high, 1–3-flowered. Leaves confined to lower $\frac{1}{2}$ of stem, $\frac{1}{2}$–$2\frac{1}{2}$ in. long, linear to oblong. Corolla 1–$1\frac{1}{2}$ in. diam., blue or white	3. *W. vincaeflora.*
Perennial, 4–12 in. high. Leaves rosulate or near the base of the stem, $\frac{3}{4}$–1 in. long. Corolla large, $\frac{2}{3}$–$1\frac{1}{3}$ in. diam., white or blue	4. *W. albomarginata.*
Stems several, sparingly branched. Leaves lanceolate-spathulate to linear, $\frac{3}{4}$–$1\frac{1}{2}$ in. Peduncles 3–6 in. long. Flowers $\frac{2}{3}$ in. long	5. *W. flexilis.*
Perennial. Stems creeping and interlaced, forming matted rounded patches 2–4 in. diam. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. diam. Capsule globose, $\frac{1}{4}$–$\frac{1}{3}$ in. diam.	6. *W. congesta.*
Perennial. Leaves crowded, spathulate, with thick white cartilaginous margins. Corolla 5-partite almost to the base; included within the calyx-lobes	7. *W. cartilaginea.*
Perennial, 9–12 in. high. Stems few, closely placed. Leaves numerous, densely crowded, spreading, linear, 1–$1\frac{1}{2}$ in. long, $\frac{1}{10}$–$\frac{1}{8}$ in. broad, thick and coriaceous. Peduncles 3–4 in. long. Corolla-lobes $\frac{1}{4}$–$\frac{1}{3}$ in. long, pale-lilac	8. *W. Matthewsii.*

W. ramosa Sieb. Fl. 1945. 196

(Forst. f.)

1. **W. gracilis** *Schrad. in Blumenbachia in obs.* (1827) 38.—A very variable annual herb 6–18 in. high. Stem slender, angled, branched from the base or in small specimens simple, glabrous or sparingly hairy near the base. Leaves usually remote above, more closely placed below, alternate or occasionally the lower ones subopposite, very variable in size, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, $\frac{1}{12}$–$\frac{1}{4}$ in. broad, linear-spathulate or linear-obovate to linear-lanceolate or linear, sessile, sinuate-dentate; margins thickened and cartilaginous; surfaces glabrous or sparingly hairy. Upper leaves smaller and narrower. Peduncles slender, terminating the branchlets, which thus form few-flowered racemes. Pedicels slender, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, glabrous. Flowers small, $\frac{1}{4}$–$\frac{1}{2}$ in. long, dark or pale blue, sometimes nearly white. Calyx 5-lobed, glabrous; tube narrow-obconic. Corolla variable in size, campanulate. Capsule $\frac{1}{4}$–$\frac{1}{3}$ in. long, obconic, narrowed into the pedicel.—*A. DC. Monog. Camp.* (1830) 142 (*in part*); *A. Rich. Fl. Nouv. Zel.* (1832) 225; *Raoul Choix* (1846) 44; *Hook. f. Fl. Nov. Zel.* i (1853) 159; *Handb. N.Z. Fl.* (1864) 169 (*in part*); *Cheesem. Man. N.Z. Fl.* (1906) 402. Campanula gracilis *Forst. f. Prodr.* (1786) p. 15. n. 84.

Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Abundant throughout, usually in heathy situations. Sea-level to 3000 ft. November–February.

Mr. N. E. Brown states that Forster's type specimen, now at Kew, cannot be exactly matched with any specimen that he has seen from Australia or New Zealand, and he therefore gives a description based on Forster's type. So far as New Zealand is concerned, however, I have little doubt that the common *Wahlenbergia* of the country, abundant in almost all districts, is for all practical purposes identical with Forster's plant.

2. **W. Colensoi** *N. E. Brown in Gard. Chron.* liv (1913) 317.—"A slender annual 1½–6 in. high, sometimes with a single stem, but usually with 3 to many stems to a root, erect, slender, roughly hairy with spreading (not deflexed) hairs on the basal part for ¼–½ of the total height. Leaves alternate or opposite, usually extending ⅓–½ of the way up the stems, $\frac{1}{12}$–$\frac{9}{12}$ in. long, the lower mostly obovate or spathulate-oblanceolate, passing into lanceolate or linear on the upper part of the stems, all more or less pubescent with spreading hairs on both sides or the uppermost glabrous, usually wavy, with the margins very distinctly thickened or hardened and scabrid (not smooth), sometimes toothed. Pedicels 1–2½ in. long, glabrous. Calyx 3–4 (rarely 5) -lobed, glabrous; tube (ovary) ellipsoid in fruit and $\frac{1}{10}$–$\frac{1}{6}$ in. long; lobes erect, linear or deltoid-linear, subacute. Corolla very small, 3–4 (rarely 5) -lobed, in dried specimens ⅛–½ in. long with lanceolate acute lobes."—W. gracilis *var.* capillaris *Hook. f. Fl. Nov. Zel.* i (1853) 159; *Handb. N.Z. Fl.* (1864) 170.

North and South Islands (?): Probably not uncommon in lowland districts, but its range has not been made out with certainty. I have seen specimens from several localities between Mangonui (*H. Carse!*) and Rotorua (*T. F. C.*).

I have reproduced Mr. N. E. Brown's actual description, showing how he distinguishes it from reduced states of *W. gracilis*.

W. gracilis (Forst.f.) Schrad. em. N.E. Brown

W. Colensoi N. E. Brown = W. gracilis var. capillaris Hook.f.

gracilis	Colensoi
10-18 in. high	1½-6 in. high
Lvs. ¾ -1½ in. long linear lanceolate	Lvs. 1/12 -9/12 in. long lower obovate or spathulate-lanceolate margins scabrid
Pedicels ⅔ -1½ in.	Pedicels 1-2½ in.
Calyx 5-lobed 2½-3 lines	Calyx 3-4-lobed rarely 5-lobed 1/10-1/6 in.
Lobes linear or deltoid-linear subacute	Lobes subulate very acute
Corolla 5-lobed	Corolla 3-4-lobed rarely 5-lobed

Of the 8 species admitted in the following account, *W. gracilis* is usually supposed to extend to Australia and New Caledonia; *W. vincaefolia* is probably more plentiful in Australia than in New Zealand; while the remaining 6 are apparently confined to New Zealand.

Annual, usually branched, 6–18 in. Leaves never rosulate, $\frac{1}{2}$–$1\frac{1}{2}$ in. × $\frac{1}{12}$–$\frac{1}{4}$ in., linear-spathulate to linear-obovate. Flowers small, $\frac{1}{5}$–$\frac{1}{2}$ in. long	1. *W. gracilis.*
Small slender annual $1\frac{1}{2}$–6 in. high, simple or branched. Stems with spreading hairs at base. Leaves $\frac{1}{12}$–$\frac{9}{12}$ in. long. Flowers very small, $\frac{1}{12}$–$\frac{1}{8}$ in. long	2. *W. Colensoi.*
Stems 9–18 in. high, 1–3-flowered. Leaves confined to lower $\frac{1}{2}$ of stem, $\frac{1}{2}$–$2\frac{1}{2}$ in. long, linear to oblong. Corolla 1–$1\frac{1}{2}$ in. diam., blue or white	3. *W. vincaeflora.*
Perennial, 4–12 in. high. Leaves rosulate or near the base of the stem, $\frac{3}{4}$–1 in. long. Corolla large, $\frac{2}{3}$–$1\frac{1}{3}$ in. diam., white or blue	4. *W. albomarginata.*
Stems several, sparingly branched. Leaves lanceolate-spathulate to linear, $\frac{3}{4}$–$1\frac{1}{2}$ in . Peduncles 3–6 in. long. Flowers $\frac{2}{3}$ in. long	5. *W. flexilis.*
Perennial. Stems creeping and interlaced, forming matted rounded patches 2–4 in. diam. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. diam. Capsule globose, $\frac{1}{4}$–$\frac{1}{3}$ in. diam.	6. *W. congesta.*
Perennial. Leaves crowded, spathulate, with thick white cartilaginous margins. Corolla 5-partite almost to the base; included within the calyx-lobes	7. *W. cartilaginea.*
Perennial, 9- numerous, $\frac{1}{10}$–$\frac{1}{8}$ in. b long. Cor	

1. **W.** variable ar the base near the b alternate o $\frac{1}{2}$–$1\frac{1}{2}$ in. lo lanceolate cartilagino and narrow form few-f Flowers sn Calyx 5-lo campanulat *A. DC. Mo* 225; *Raou N.Z. Fl.* (1 panula grac

KERMAD ISLANDS: A November–F

Mr. N. exactly matc and he there is concerned, abundant in plant.

2. **W. Colensoi** *N. E. Brown in Gard. Chron.* liv (1913) 317.—"A slender annual 1½–6 in. high, sometimes with a single stem, but usually with 3 to many stems to a root, erect, slender, roughly hairy with spreading (not deflexed) hairs on the basal part for ¼–½ of the total height. Leaves alternate or opposite, usually extending ⅓–½ of the way up the stems, $\frac{1}{12}$–$\frac{9}{12}$ in. long, the lower mostly obovate or spathulate-oblanceolate, passing into lanceolate or linear on the upper part of the stems, all more or less pubescent with spreading hairs on both sides or the uppermost glabrous, usually wavy, with the margins very distinctly thickened or hardened and scabrid (not smooth), sometimes toothed. Pedicels 1–2½ in. long, glabrous. Calyx 3–4 (rarely 5) -lobed, glabrous; tube (ovary) ellipsoid in fruit and $\frac{1}{10}$–$\frac{1}{6}$ in. long; lobes erect, linear or deltoid-linear, subacute. Corolla very small, 3–4 (rarely 5) -lobed, in dried specimens $\frac{1}{12}$–$\frac{1}{8}$ in. long with lanceolate acute lobes."—W. gracilis *var.* capillaris *Hook. f. Fl. Nov. Zel.* i (1853) 159; *Handb. N.Z. Fl.* (1864) 170.

North and South Islands (?): Probably not uncommon in lowland districts, but its range has not been made out with certainty. I have seen specimens from several localities between Mangonui (*H. Carse!*) and Rotorua (*T. F. C.*).

I have reproduced Mr. N. E. Brown's actual description, showing how he distinguishes it from reduced states of *W. gracilis.*

3. **W. vincaeflora** *Decaisne in Rev. Hort.* Ser. iii (1849) 41.—Stem 9–18 in. high, 1–3-flowered, glabrous. Leaves confined to the lower ½ of the stem, opposite or alternate or the basal subrosulate, ½–2½ in. long, $\frac{1}{12}$–⅓ in. broad, linear to oblong or those of the rosette spathulate, often wavy, glabrous. Calyx 5-lobed, glabrous; lobes ⅕–⅖ in. long, ascending-spreading, subulate-attenuate, acute; tube (ovary) narrowly obconic, uniformly green. Corolla 1–1½ in. in diam., glabrous, light bright blue or white; tube campanulate, ⅓ in. long and as much in diameter; lobes spreading, ½–¾ in. long, ⅓–½ in. broad, ovate or elliptic-ovate, obtuse or subacute, with a small apiculus.—*Lindl. et Paxton Flower Gard.* ii (1851) 13, fig. 142; *Irving in Gard. Chron.* lii (1912) 216; *N. E. Brown in Gard. Chron.* liv (1913) 355. Campanula vincaeflora *Ventenat Hort. Malm.* (1803) t. 12. C. gracilis *Bot. Mag.* (1803) t. 691 (*not of Forst.*).

New Zealand: On the authority of *N. E. Brown* ("Gardener's Chronicle").

The above description is that given by Mr. Brown in his memoir. From the synonyms quoted by him it appears to have been included by previous writers (notably Hooker and Bentham) under the circumscription of *W. gracilis.* But I have never seen any New Zealand specimens of *W. gracilis* with flowers that at all approach in size that given by Mr. Brown in his description of *W. vincaeflora.* But *W. albomarginata* has flowers of somewhat similar magnitude. The position of the two plants requires careful examination.

4. **W. albomarginata** *Hook. Ic. Plant.* (1852) t. 818.—A small perennial herb 4–12 in. high, either simple or with a branched rootstock putting up few or several erect stems, usually leafy at the base only. Leaves 10–12, mostly or all radical, laxly or compactly rosulate, ¾–1 in. long, ⅛–¼ in. broad, spathulate, the blade varying from oblanceolate to broadly obovate, obtuse or subacute, greenish, but the margins and under-surface often reddish-brown; petioles frequently furnished with reflexed hairs. Peduncles 1 or few to a rosette, 3–10 in. high, 1-flowered, glabrous. Calyx-tube obconic; lobes 5, ovate-subulate, brownish-green. Corolla ⅔–1⅓ in. diam., campanulate, white or pale-blue; lobes spreading. Capsule obconic. Seeds numerous,

compressed, smooth. — *N. E. Brown in Gard. Chron.* liv (1913) 336. W. saxicola *Hook. f. Fl. Nov. Zel.* i (1853) 160; *Handb. N.Z. Fl.* (1864) 170; *Bot. Mag.* (1882) t. 6613; *Cheesem. Man. N.Z. Fl.* (1906) 402; *Ill. N.Z. Fl.* i (1914) t. 121 (*not of A. De Candolle*).

Var. **pygmaea** *N. E. Brown l.c.*—A dwarf subalpine or alpine variety, frequently not much more than 1–2 in. high. Flowers frequently drooping.—W. pygmaea *Col. in Trans. N.Z. Inst.* xxxi (1899) 273.

North and South Islands, Stewart Island: Abundant in hilly and mountainous situations from the East Cape and Taupo southwards; var. *pygmaea* not uncommon over 3000 ft. alt. December–February.

I have followed Mr. N. E. Brown's views as to the specific distinctness of this plant from the Tasmanian *W. saxicola*. He states that "it is difficult to understand how they could possibly have been confused, as they are easily distinguishable in the dry state, and when seen alive, side by side, their perfect distinctness is too obvious for any one to mistake one for the other."

5. **W. flexilis** *Petrie in Trans. N.Z. Inst.* xlix (1917) 51. — Stems several from the top of a long slender root, slender, terete, glabrous, sparingly branched, 4–8 in. long; the branches often laxly interlaced. Leaves in distant opposite pairs on the lower part of the stem, the upper leaves alternate and often crowded, variable in size and shape, $\frac{3}{4}$–$1\frac{1}{2}$ in. long, $\frac{1}{4}$ in. in greatest breadth, lanceolate-spathulate to linear, gradually narrowed to the base, acute or subacute, entire, glabrous, thin or subcoriaceous; margins somewhat cartilaginous; midrib evident; veins reticulate, more or less obscure. Peduncles terminating the branchlets, 3–6 in. long. Flowers about $\frac{2}{3}$ in. long. Calyx narrow, 5-lobed; lobes linear-subulate. Corolla funnel-shaped, cut $\frac{1}{3}$-way down into 5 triangular acute lobes. Capsule obconic, $\frac{1}{4}$ in. long. T. 71 (1941) 64

South Island: Marlborough—Inland Kaikouras, several localities in the higher parts of the Clarence Valley, *B. C. Aston!*

A curious and apparently very variable plant. Some states approach *W. albomarginata*, but ordinarily it differs in the branched habit of growth and numerous cauline leaves.

6. **W. congesta** *N. E. Brown in Gard. Chron.* liv (1913) 336. — Perennial; stems creeping, much branched and interlaced, forming densely matted rounded patches 2–4 in. diam.; branches compact or diffusely spreading, glabrous or furnished with spreading or deflexed hairs, leafy towards the tips. Leaves very variable in size and shape, $\frac{1}{3}$–1 in. long, orbicular- or oblong-spathulate or narrower, submembranous, midrib obscure, crenate-dentate, suddenly narrowed into a petiole longer than the blade, margins of petiole usually ciliate. Peduncles short, $\frac{1}{2}$–2 in. long, slender, erect, terete, with or without a single lanceolate toothed bract about the middle. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. diam., pale-blue, campanulate. Calyx shallow-turbinate; lobes narrow-triangular, acute. Capsule globose, $\frac{1}{4}$–$\frac{1}{3}$ in. diam., 2-celled. Seeds numerous, minute.—W. saxicola *var.* congesta *Cheesem. Man. N.Z. Fl.* (1906) 403. W. Morgani *Petrie in Trans. N.Z. Inst.* xlvi (1914) 34.

South Island: Nelson—Moist sand-dunes between Cape Foulwind and Charleston, *W. Townson! Petrie!* Southland—Sand-dunes at Fortrose, *Petrie!*

Although closely allied to *W. albomarginata* it is well distinguished from it, and from all the New Zealand species, by the globose capsule and peculiar habit.

W. Tamaga Simp. 75 (1945) 196. Scatown

7. **W. cartilaginea** *Hook. f. Handb. N.Z. Fl.* (1864) 170. — A dwarf perennial herb seldom more than 2–3 in. high, glabrous or more or less pubescent. Rhizome long, wide-creeping and tortuous, somewhat fleshy. Leaves all radical, forming a shortly elongate dull-green rosette, ascending or almost spreading, ½–1 in. long, ovate-spathulate, rigid, with a broad flattened petiole and an ovate or rarely obovate blade, obtuse at the apex, subcordate at the base, quite entire; margins thick, cartilaginous. Peduncle ¾–1¼ in. long, 1-flowered. Flowers ½ in. diam. Calyx 5-lobed, glabrous or pubescent; tube shortly obconic; lobes large, linear-oblong, obtuse or subacute, margins entire, thick and cartilaginous. Corolla equalling or slightly exceeding the calyx-lobes, 5-lobed; tube shorter than the lobes; lobes oblong-lanceolate or elliptic-oblong, obtuse. Capsule broadly obconic, ½ in. diam.—*Cheesem. Man. N.Z. Fl.* (1906) 408; *N. E. Brown in Gard. Chron.* liv (1913) 355.

South Island: Marlborough—Shingly Range, Awatere, *Cockayne* and *Foweraker.* Nelson—Wairau Gorge, *Rough, T. Kirk!* Tarndale, *Sinclair!* Clarence and Wairau Valleys, *W. T. L. Travers;* Lake Tennyson, *R. M. Laing.* 3500–6000 ft. January–February.

A very remarkable species, easily distinguished by the broad and thick cartilaginous margins to the leaves, large calyx-lobes, and small deeply divided corolla. It is apparently rare and local, and I have only seen very indifferent specimens. Dr. Cockayne says that it resembles "a crusty Saxifrage." Hooker remarks that the flowers are very sweet-scented.

8. **W. Matthewsii** *Cockayne in Trans. N.Z. Inst.* xlvii (1915) 113.—A perfectly glabrous perennial herb 9–12 in. high. Rhizome short, stout, woody, often swollen and tuberous. Stems few, closely placed, simple or branched, reddish-purple, spreading or decumbent at the base, usually more or less erect above. Leaves numerous, densely crowded, spreading, linear, 1–1½ in. long, 1/10–⅛ in. broad, sessile or nearly so, acute or subacute, thick and coriaceous, quite glabrous, notched towards the apex, otherwise entire. Peduncles 3–4 in. long, slender, erect, simple or sparingly branched; bracts few, minute. Calyx-lobes equalling the corolla-tube, subulate-acute. Corolla-lobes about ¼ in. long, ovate, pale-lilac. Capsule obconic, ¼ in. long.

South Island: Marlborough—Clarence Valley, near the coast, *H. J. Matthews, Cockayne!* Ure Basin, *B. C. Aston.* Trans. 75 195

Easily distinguished from any other species known to me by the long and closely-set linear leaves, the purplish stems, and the large pale-lilac flowers. My specimens are few in number, and the above description may require amendment when a better series has been obtained.

Family CII. GOODENIACEAE.

Herbs or shrubs. Leaves alternate or radical, rarely opposite; stipules wanting. Flowers hermaphrodite, irregular or rarely regular, axillary or terminal, solitary or in spikes or racemes or panicles. Calyx-tube adnate to the ovary, limb of 5 persistent lobes or obsolete. Corolla gamopetalous, usually irregular, 5-lobed, often split to the base at the back. Stamens 5, alternate with the lobes of the corolla and inserted at its base; anthers free or rarely connate into a ring surrounding the style. Ovary inferior or nearly so, 1–2-celled; style simple, with a cup-shaped or 2-lipped expansion which encloses the stigma, and is called the indusium; ovules

1 or 2 or more in each cell, erect or ascending. Fruit an indehiscent drupe or nut or a 2–4-valved capsule. Seeds albuminous; embryo axile, radicle next the hilum.

A family containing 13 genera and about 300 species, nearly the whole of which are confined to Australia, a few species of *Scaevola* extending to the Pacific islands and the coasts of tropical Asia and Africa, and one species of *Selliera* to South America. The family has no important properties.

Creeping fleshy herb. Leaves linear-spathulate, entire. Berry many-seeded .. .. 1. SELLIERA.

The New Zealand species a diffuse or procumbent undershrub. Drupe 2-celled, with one seed in each cell .. .. .. 2. SCAEVOLA.

1. SELLIERA Cav. 1799

Small glabrous creeping and rooting perennial herbs. Leaves alternate or fascicled at the nodes, entire. Flowers axillary, sessile or pedunculate. Calyx-tube adnate to the ovary; limb 5-lobed or -partite. Corolla oblique, split to the base at the back; limb of 5 nearly equal lobes, at length digitately spreading; the margins inflexed or winged. Stamens 5, epigynous; anthers free. Ovary inferior, more or less completely 2-celled; ovules numerous in each cell. Style undivided; stigma short, truncate, enclosed within the cup-shaped indusium. Fruit fleshy, indehiscent. Seeds usually numerous, compressed or irregularly shaped.

A small genus of 2 species, 1 of which is confined to Western Australia; the other occurs in Australia, Tasmania, and Chile, as well as in New Zealand.

1. **S. radicans** *Cav. Ic.* v (1799) 49, t. 474.—A glabrous creeping and rooting perennial; stems 1–10 in. long, usually matted and interlaced, forming broad flat patches. Leaves variable in size, ½–4 in. long, linear-spathulate to oblong-spathulate or obovate-spathulate, obtuse, narrowed into a long petiole, quite entire, nerveless, very thick and fleshy. Peduncles axilliary, 1- or rarely 2-flowered, shorter than the leaves, with 2 subulate bracts above the middle. Flowers white, ⅓ in. long. Calyx-lobes lanceolate or linear. Corolla-lobes ovate, acute, not winged. Fruit fleshy, ovoid or obovoid, about ¼ in. long. Seeds compressed, orbicular, narrowly winged.—*Handb. N.Z. Fl.* (1864) 173; *Fl. Tasm.* i (1860) 231; *Benth. Fl. Austral.* iv (1869) 82; *Cheesem. Man. N.Z. Fl.* (1906) 394. S. fasciculata *Buch. in Trans. N.Z. Inst.* iii (1871) 211. S. microphylla *Col. l.c.* xxii (1890) 473. Goodenia repens *Lab. Pl. Nov. Holl.* i (1804) 53, t. 76; *A. Rich. Fl. Nouv. Zel.* (1832) 228; *A. Cunn. Precur.* (1838) 428; *Raoul Choix* (1846) 45; *Hook. f. Fl. Nov. Zel.* i (1853) 156. Trans. 52. 190

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Common in muddy or sandy or rocky places near the sea. Inland by the margins of the larger lakes, &c., ascending to over 2500 ft. at the base of Ruapehu. November–February.

For notes on the fertilization, see a paper by myself in the Trans. N.Z. Inst. ix (1877) 542.

2. SCAEVOLA Linn. 1771.

Herbs, undershrubs, or shrubs. Leaves alternate, rarely opposite, entire or toothed. Flowers axillary, solitary or in small cymes. Calyx-tube adnate to the ovary; limb short, 5-partite or cupular, sometimes obsolete. Corolla oblique, split to the base at the back; lobes 5, nearly

equal, at length digitately spreading. Stamens 5; anthers free. Ovary inferior or the summit free, 2-celled; ovules solitary in each cell, erect. Style undivided; stigma truncate or 2-lobed, enclosed in the cup-shaped indusium. Fruit indehiscent, exocarp succulent or thin and membranous, endocarp woody or bony or rarely crustaceous. Seeds solitary in each cell.

A large genus of 60 or 70 species, over 50 of which are confined to Australia. The remainder are scattered through the Pacific islands and along the coasts of tropical Asia, one extending to tropical Africa and the West Indies. The single species found in New Zealand is endemic.

1. **S. gracilis** *Hook. f. in Journ. Linn. Soc.* i (1857) 129. — A procumbent undershrub 2–4 ft. high; branches long, spreading, and with the leaves clothed with silky hairs; axils of the leaves densely villous. Leaves alternate, 1–3 in. long, obovate-lanceolate or oblong-lanceolate, acute, serrate-dentate, narrowed into a rather long petiole. Flowers $\frac{3}{4}$ in. long, axillary, solitary, sessile or shortly peduncled, white with a yellow eye, sweet-scented; bracts 2, rarely 4, linear-lanceolate. Calyx cupular, indistinctly lobed. Corolla with a short villous tube and 5 narrow segments, mucronate at the tips. Stamens equal, shorter than the corolla-tube. Style pilose; indusium deeply cup-shaped, margins fringed. Drupe globose, $\frac{2}{5}$ in. long, white.—*Handb. N.Z. Fl.* (1864) 173.

Kermadec Islands: Abundant on cliffs near the sea, *McGillivray, Shakespear! T. F. C., W. R. B. Oliver!* July–December.

Hooker describes the calyx as having 3 subulate lobes and 2 shorter intermediate ones, but in my own specimens and Mr. Shakespear's it is invariably cupular and very indistinctly lobed.

Family CIII. **STYLIDIACEAE.**

Herbs, rarely undershrubs. Leaves alternate, scattered or densely imbricate, entire; stipules wanting. Flowers hermaphrodite or unisexual, regular or almost irregular. Calyx adnate to the ovary; lobes 3–7, but usually 5, free or connate into 2 lips. Corolla polypetalous or far more commonly gamopetalous, 5–10-merous, but generally 5-merous; the lobes subregular and equal in the New Zealand genera, but in the bulk of the family the lowest lobe is smaller and narrower and recurved, and is known as the labellum. Stamens 2–3, free; but more commonly 2, with the filaments united with the style into a column; anthers sessile at the top of the column. Ovary inferior, more or less completely 2–3-celled, usually crowned with 1 or 2 fleshy glands. Styles rarely 2–3, or usually connate with the column, the stigma hidden between the column; ovules numerous in each cell. Fruit a 1–3-celled capsule, dehiscent or indehiscent. Seeds numerous or free by abortion, minute; albumen fleshy; embryo minute, next the hilum.

A small family, comprising 6 genera and about 120 species, most of them falling into the typical genus *Stylidium*, which is not represented in New Zealand. Of the 4 New Zealand genera, *Donatia* extends to Antarctic America; *Phyllachne* has a similar distribution; *Forstera* has a single species in Tasmania in addition to the 3 found in New Zealand; while *Oreostylidium* is endemic. The 2 remaining genera, *Levenhookia* and *Stylidium*, with the exception of very few species, are confined to Australia and Tasmania.

A. DONATIEAE. *Corolla polypetalous. Stamens 2–3, free* .. 1. DONATIA.

B. STYLIDIEAE. *Corolla gamopetalous. Stamens 2, connate with the style into a gynostemium or "column."*

Leaves densely imbricated, forming hard bright-green patches. Flowers sessile among the leaves. Capsule turbinate .. 2. PHYLLACHNE.

Stems slender, branched. Scapes longer than the leaves. Capsule ovoid or oblong .. .. 3. FORSTERA.

Stems short. Leaves tufted, squarrose, subulate. Scapes shorter than the leaves .. .. 4. OREOSTYLIDIUM.

1. **DONATIA** Forst. 1776

Small densely tufted herbs, forming hard compact masses. Leaves densely imbricated, linear, coriaceous, quite entire. Flowers terminal, solitary. Calyx-tube adnate to the ovary, obconic; lobes 3–7, equal or unequal. Petals 5–10, linear-oblong to ovate. Stamens 2–3, inserted on the middle of an epigynous disc, and adnate to the base of the styles; filaments subulate or filiform; anthers didymous, extrorse. Ovary inferior, 2–3-celled; styles 2–3, short and thick or subulate, recurved; stigmas simple or capitellate; ovules numerous, affixed to placentas that are pendulous from the inner angles of the cells. Capsule turbinate, indehiscent, 2–3-celled. Seeds few in each cell, pendulous, obliquely ovoid; testa membranous; albumen fleshy; embryo small, remote from the hilum.

A genus of 2 species, 1 found in New Zealand and Tasmania, the other (*D. fascicularis* Forst.) a native of Fuegia. Its exact systematic position has been much discussed. It was referred to the *Saxifragaceae* by Hooker, who, however, also pointed out its affinity with the *Stylidiaceae,* with which it agrees in the stamens being placed on the centre of an epigynous disc, in the extrorse anthers, and in the placentation. It was removed to that family by Baron Mueller ("Knovo Giornale Botanico Italiano," xi, July, 1879). Mildbraed in the "Pflanzenreich" (Heft 35) also retains it in the *Stylidiaceae;* but Skottsberg ("The Plant World," May, 1915) suggests that it should be treated as the type of a new family. DONATIACEAE. Skottsb. Plant World 18(1915)137

1. **D. novae-zelandiae** *Hook. f. Fl. Nov. Zel.* i (1853) 81, t. 20. — Stems short, 1–3 in. high, densely tufted, forming broad compact masses in mountain-bogs. Leaves very numerous, imbricated in many series and clothing the entire stem and branches, erect, appressed, $\frac{1}{3}$ in. long, subacute, shining, veinless, very thick and coriaceous, villous at the base. Flowers $\frac{1}{3}$ in. diam., sunk amongst the uppermost leaves. Calyx-lobes 5, ovate, acute. Petals 5, quite free, ovate-oblong, obtuse, thick and fleshy. Stamens 2, styles 2, short and thick, recurved. Capsule $\frac{1}{5}$ in. long.—*Handb. N.Z. Fl.* (1864) 58; *Benth. Fl. Austral.* ii (1864) 450; *F. Muell. Fragm.* viii (1873) 41; *Cheesem. Man. N.Z. Fl.* (1906) 134; *Mildbraed in Pflanzenr.* Heft 35 (1908) 20, fig. 7, D–F. Trans. 50:187 + 91:91.

NORTH ISLAND: Mount Holdsworth, Tararua Range, *W. Townson!* SOUTH ISLAND: Not uncommon in alpine bogs throughout. STEWART ISLAND: *Petrie! T. Kirk! Cockayne.* Mostly between 3000 and 5000 ft., but descends almost to sea-level on Stewart Island. December–March.

2. **PHYLLACHNE** Forst. 1776

Densely tufted perfectly glabrous moss-like plants, forming hard and compact flat or convex masses in alpine localities. Leaves small, closely imbricating. Flowers sessile among the leaves at the tips of the branches, monoecious or polygamo-dioecious. Calyx-tube obconic; lobes 5–9, equal

or slightly unequal. Corolla almost regular; tube short; limb spreading, with 4–9 subequal lobes, often glandular at the base. Column short, straight, erect. Epigynous glands 2, semi-lunar. Ovary obovoid-turbinate, broad at the top, imperfectly 2-celled at the base. Capsule small, turbinate, flattened at the summit, coriaceous, indehiscent. Seeds numerous, obovoid.

The genus differs from *Forstera* mainly in habit and in the turbinate capsule. In addition to the **3** species found in New Zealand there is another in Fuegia. The New Zealand forms are very closely allied, differing chiefly in the width of the leaves and the length of the column.

Leaves linear, broad at the base. Column scarcely exserted .. 1. *P. clavigera.*
Leaves shorter, broadly ovate at the base. Column much exserted .. 2. *P. Colensoi.*
Leaves linear, not broad at the base. Column included or scarcely exserted .. .. 3. *P. rubra.*

1. **P. clavigera** *F. Muell. Fragm.* viii (1873) 40.—Stems short, 1–2½ in. long, most densely compacted, leafy throughout. Leaves erect, imbricated in very many series, ⅙ in. long, linear-oblong with a dilated base, concave in front, convex at the back, very thick and coriaceous, quite entire; tips obtuse, thickened and knobbed, a glandular pore on the back just below the apex. Flowers white, ⅛–⅙ in. diam. Calyx-lobes 5–6, linear-oblong, obtuse. Corolla-lobes 5–7, obovate, those of the male flowers without glands at the base or with very indistinct ones, the females or hermaphrodites with conspicuous linear glands. Column stout, erect, slightly exserted. Anthers narrow-reniform. Stigmas of the female flowers large, plumose-papillose; of the males or hermaphrodites smaller, smooth, almost hidden between the anthers. Capsule turbinate, ultimately opening by the falling-away of the top. Seeds 6–8.—*Cheesem. Man. N.Z. Fl.* (1906) 390; *Mildbraed in Pflanzenr.* Heft 35 (1908) 22. Helophyllum clavigerum *Hook. f. Handb. N.Z. Fl.* (1864) 167. Forstera clavigera *Hook. f. Fl. Antarct.* i (1844) 38, t. 28. F. aretiastrifolia *Homb. and Jacq. Bot. Voy. Astrol. et Zel.* (1853) t. 16c.

South Island: Various localities in the Alps of Canterbury and Otago, apparently not common; altitude 4000–6000 ft. Auckland and Campbell Islands: Abundant on the hills; 500–1250 ft. December–March.

For a full account of this singular plant reference should be made to the detailed description and excellent plate given in the "Flora Antarctica."

(Hook. f.)

2. **P. Colensoi** *Berggr. in Minnesk. Fisiog. Sallsk. Lund.* (1877) 11.—Habit and appearance of *P. clavigera*, but leaves shorter and broader, often broadly ovate at the base. Flowers rather smaller; column much longer and more slender, far-exserted beyond the corolla in the usual state.—*Cheesem. Man. N.Z. Fl.* (1906) 390; *Mildbraed in Pflanzenr.* Heft 35 (1908) 21. Helophyllum Colensoi *Hook. f. Handb. N.Z. Fl.* (1864) 168. H. muscoides *Col. in Trans. N.Z. Inst.* xxvi (1894) 318. Forstera clavigera *Hook. f. Fl. Nov. Zel.* i (1853) 155 (*not of Fl. Antarct.*).

Var. **Haastii.**—Upper half of leaf narrower, semiterete, not thickened at the tip.—P. Haastii *Berggr. in Journ. Bot.* ix, n.s. (1880) 104. P. Colensoi *Berggr. in Minnesk. Fisiog. Sallsk. Lund.* (1877) t. 3, f. **1** to 27.

North and South Islands, Stewart Island: From Hikurangi, Tongariro, and Mount Egmont southwards, an abundant alpine plant. 3000–6000 ft. December–February.

This appears to pass imperceptibly into *P. clavigera*, and should be regarded as a variety of that species.

Cantor Mem. Lect. R.S. Tasm. 31–33 1946.

3. **P. rubra** *Cheesem. Man. N.Z. Fl.* (1906) 391.—Stems shorter than in *P. clavigera*, ½–1 in. high, densely tufted, frequently bare of leaves below. Leaves erect, very densely imbricated, linear, not dilated at the base or very obscurely so, very thick and coriaceous; tips much thickened, forming a large globose knob. Flowers $\frac{1}{6}$–$\frac{1}{5}$ in. diam., white, but becoming dark-red when dry. Corolla-lobes 5–7, unequal. Column stout, included or slightly exserted.—Helophyllum rubrum *Hook. f. Handb. N.Z. Fl.* (1864) 168; *Buch. in Trans. N.Z. Inst.* xiv (1882) 351, t. 31, f. 2.

South Island: Otago—Mount Aspiring Range, *Buchanan* and *McKay!* Mount Arnould and the Hector Mountains, *Petrie!* summit of Rock and Pillar Range, *Cockayne!* 4500–6000 ft. January–March.

This is evidently close to *P. clavigera*, but the large globose knobs at the tips of the leaves give it a distinct appearance.

3. **FORSTERA** Linn. f. 1780

Glabrous perennial herbs. Stems simple or branched, erect or decumbent. Leaves small, entire, densely or laxly imbricating, spreading or recurved. Peduncles terminal, slender, 1-flowered or more rarely 2–5-flowered. Flowers white, erect or nodding, sometimes unisexual. Calyx-tube ovoid; lobes 5 or 6, equal or nearly so. Corolla almost regular; tube short; limb campanulate, with 5–9 nearly equal lobes; throat naked or glandular. Column short, erect. Ovary oblong or ovoid, imperfectly 2-celled at the base. Capsule 1-celled, somewhat membranous, opening at the apex. Seeds numerous, elliptical or fusiform; testa lax, produced at each end.

In addition to the 3 species described below, which are confined to New Zealand, there is another from the mountains of Tasmania.

Leaves $\frac{1}{8}$–$\frac{1}{4}$ in., imbricate, recurved, sessile, obovate-spathulate; midrib broad and thick, cuneate	1. *F. sedifolia.*
Leaves $\frac{1}{4}$–$\frac{1}{2}$ in., close-set, spreading and recurved, sessile, obovate or linear-obovate; midrib indistinct	2. *F. Bidwillii.*
Leaves $\frac{1}{4}$–$\frac{2}{3}$ in., lax, erect or spreading, shortly petioled, oblong-obovate; midrib obsolete	3. *F. tenella.*

4. F. mackayi

1. **F. sedifolia** *Linn. f. Suppl.* (1781) 407.—Stems 2–12 in. long, stout or slender, simple or sparingly divided, rarely much branched, erect or decumbent at the base, densely leafy throughout. Leaves closely imbricating, spreading and recurved, sessile by a broad base, $\frac{1}{8}$–$\frac{1}{4}$ in. long, obovate-spathulate or oblong-spathulate, obtuse, very thick and coriaceous, shining, often reddish-brown, nerveless above, midrib thickened and almost cuneate beneath; margins broad, cartilaginous. Peduncle slender, strict, 2–4 in. long, 1–2-flowered. Flowers very variable in size, $\frac{1}{4}$–$\frac{1}{2}$ in. diam. or more. Bracts 2–3, oblong, obtuse. Calyx-lobes 6, linear-oblong, obtuse. Corolla-tube very short; lobes 6, linear-oblong, obtuse, each with 2 linear glands at the base. Column short; anthers 2, sessile at the top of the column, transverse, reniform; stigma 2-lobed, the lobes spreading between the anthers, papillose. Epigynous glands 2, narrow-clavate. Capsule oblong-clavate.—*A. Rich. Fl. Nouv. Zel.* (1832) 229; *A. Cunn. Precur.* (1838) n. 427; *Raoul Choix* (1846) 45; *Hook. f. Fl. Nov. Zel.* i (1853) 154; *Handb. N.Z. Fl.* (1864) 166; *Berggr. in Minnesk. Fisiog. Sallsk. Lund.* viii (1877) 9, t. 2, f. 20. Phyllachne sedifolia *F. Muell. Fragm.* viii (1872–74) 40.

F. mackayi Allan Trans. 65:1935:221 Boulder Lake. ♂ 71:95.

Var. **oculata** *Cheesem.*—Flowers much larger, ½–¾ in. diam., usually with a dark eye.

South Island, Stewart Island: Not uncommon on the higher mountains, chiefly in the central and western districts. Var. *oculata:* Mount Rochfort, near Westport, *W. Townson!* Humboldt Mountains, *Cockayne!* Clinton Valley, *Petrie! Cockayne;* Routeburn, *Poppelwell;* Longwood Range, *Cockayne!* Fraser Peaks (Stewart Island), *Thomson* and *Petrie!* 2000–5000 ft. December–March.

Best distinguished by the short and broad very coriaceous recurved leaves, with a broad and thick cuneate midrib beneath.

2. **F. Bidwillii** *Hook. f. Fl. Nov. Zel.* i (1853) 155.—Stems 2–8 in. long, rather stout, usually branched above, decumbent or rooting below, lower part naked and scarred, often reddish, upper portion leafy. Leaves numerous, close-set, spreading and often recurved, ¼–½ in. long, obovate or linear-obovate to linear-oblong, obtuse or subacute, coriaceous, not shining, green, nerveless above, midrib very indistinct beneath; margins cartilaginous, flat or recurved. Peduncle 2–4 in. long, 1–3-flowered. Flowers much as in *F. sedifolia*, but smaller, ¼–⅓ in. diam., rarely more. Corolla-lobes shorter and broader, linear glands at the base of the lobes more conspicuous. Epigynous glands subulate. Capsule oblong-clavate.—*Handb. N.Z. Fl.* (1864) 167; *Berggr. l.c.* t. 2, f. 1 to 19; *Cheesem. Man. N.Z. Fl.* (1906) 393; *Mildbraed in Pflanzenr.* Heft 35 (1908) 23. F. truncatella *Col. in. Trans. N.Z. Inst.* xx (1888) 196. F. major *Col. l.c.* xxxi (1899) 272.

Var. **densifolia** *Mildbraed l.c.* 25.—Stems densely leafy. Leaves larger, up to ¾ in. long by ¼ in. broad; bracts also longer.

North and South Islands: Not uncommon in mountain districts from Hikurangi, Tongariro, and Mount Egmont to the south of Otago. Var. *densifolia:* Mount Egmont, *Petrie! T. F. C.;* Tongariro and Ruapehu, *T. F. C.;* and probably the same as *F. major* Col. from the Ruahine Mountains. 2500–6000 ft. December–March.

Closely allied to the preceding, but perhaps sufficiently distinct in the longer and more laxly placed less coriaceous leaves, which have a very indistinct midrib beneath. Berggren's figure is by no means characteristic of the usual state of the species.

3. **F. tenella** *Hook. f. Fl. Nov. Zel.* i (1853) 155.—Very closely allied to *F. Bidwillii*, and probably a mere variety of that plant, but more slender and less branched, with much fewer laxly placed leaves. Leaves erect or spreading, seldom recurved, ¼–½ in. long or more, narrow oblong-obovate, obtuse or subacute, narrowed into a short petiole, dark-green and veinless above, midrib obsolete beneath, hardly coriaceous; margins flat or recurved. Flowers similar to those of *F. Bidwillii*, but rather narrower. Capsule narrow-clavate.—*Handb. N.Z. Fl.* (1864) 167; *Berggr. l.c.* t. 2, f. 21 to 39; *Cheesem. Man. N.Z. Fl.* (1906) 393; *Mildbraed in Pflanzenr.* Heft 35 (1908) 25.

North and South Islands: Mountain districts from the Ruahine Mountains southwards, not uncommon.

Very near to *F. Bidwillii*, and best distinguished by the slender stems, fewer leaves, which are usually more laxly placed, and by the nearly obsolete midrib.

4. **OREOSTYLIDIUM** Berggr. 1827

A small stemless perennial herb. Leaves numerous, all radical. Scape short, 1-flowered. Calyx more or less evidently 2-lipped; lower lip 2-fid, upper lip 3-fid. Corolla almost regular, campanulate, deeply 5-lobed; the lobes equal in size, irregularly spreading. Column short, straight, erect, much shorter than the corolla-lobes; anthers didymous, 4-celled

and 4-lobed; lobes ultimately spreading; stigma placed between the anthers, 2-lobed, lobes spreading and deflexed. Ovary 2-celled or 1-celled by imperfection of the dissepiment; ovules numerous, attached to the centre of the dissepiment. Capsule coriaceous, indehiscent or tardily rupturing, more or less completely 2-celled. Seeds numerous, obovoid; testa lax, cellular.

A monotypic genus confined to New Zealand. It differs from *Stylidium* in the corolla-lobes being equal in size, in the short erect column, and in the indehiscent fruit.

1. **O. subulatum** (Hk.f.) *Berggr. in Minnesk. Fisiog. Sallsk. Lund.* viii (1877) 2, t. 1.—Small, densely tufted. Rootstock short, often emitting stolons; roots long, fibrous. Leaves spreading and recurved, ½–1½ in. long, linear-subulate, mucronate or almost pungent, rigid when dry, concave above, slightly convex beneath, quite glabrous; margins entire. Scape much shorter than the leaves, stout, and with the calyx glandular-pubescent. Flowers small, ⅙ in. diam. Calyx-lobes variable in depth. Corolla-lobes oblong, obtuse. Capsule ¼ in. long, ovoid-oblong, almost woody.—*Cheesem. Man. N.Z. Fl.* (1906) 391; *Mildbraed in Pflanzenr.* Heft 35 (1908) 26, f. 9. Stylidium subulatum *Hook. f. Handb. N.Z. Fl.* (1864) 168. Phyllachne subulata *F. Muell. in Journ. Bot.* (1878) 174. Oreostylidium affine *Col. in Trans. N.Z. Inst.* xx (1888) 197.

North and South Islands, Stewart Island: Base of Tongariro and Ruapehu, Waimarino Plains, *Berggren, T. Kirk! T. F. C., Cockayne;* Ruahine Mountains, *Tryon! B. C. Aston!* Kaimanawa Mountains, *B. C. Aston!* Nelson—Not uncommon in damp peaty localities, *W. T. L. Travers, Haast, Buchanan! T. F. C.;* Mount Rochfort, *W. Townson!* Otago—Wet peaty localities in the east and south, *Berggren, T. Kirk! Petrie! Buchanan! Poppelwell.* Stewart Island: *Petrie, T. Kirk! Cockayne.* Sea-level to 4000 ft. December–March. T. 71: 95.

Family CIV. **COMPOSITAE.**

Herbs, shrubs, or small trees. Leaves alternate, rarely opposite or whorled; stipules wanting. Inflorescence composed of one or many flower-heads (*capitula*), each consisting of numerous minute flowers (*florets*) sessile and densely packed on the enlarged tip of the flower-stalk (*receptacle*), surrounded by an involucre of whorled bracts and resembling a single flower. Heads either solitary and terminal (rarely axillary) or arranged in corymbose cymes or panicles, sometimes contracted into clusters or even compound heads. Involucre of few or many bracts (scales of the involucre) arranged in one or several rows. Receptacle either naked (no bracteoles mixed with the florets) or with bracteoles in the shape of chaffy scales or bristles (*paleae*) placed at the outside of most or all of the florets, sometimes with the surface pitted or honeycombed. Florets many or few (very rarely 1), either all of one kind as regards sex, when the heads are said to be *homogamous*, or of more than one kind, when they are called *heterogamous*. The homogamous heads either have all their florets tubular and hermaphrodite (*discoid*) or all ligulate and hermaphrodite (*liguliflorous*). The heterogamous heads frequently have the central florets tubular and hermaphrodite or male, and the outer ones ligulate and female or neuter. The heads are then said to be *radiate*. The tubular florets in the centre are called florets of the disc, or simply *disc-florets;* the ligulate ones florets of the ray, or *ray-florets*. Heterogamous heads are also discoid when the marginal female florets have tubular corollas

instead of ligulate. Calyx superior, adnate to the ovary and hardly to be distinguished from it; limb either wanting or composed of scales, bristles, or hairs, and then called *pappus*. Corolla gamopetalous, superior, either tubular or campanulate with 4–5 valvate lobes, or ligulate with the lobes cohering into a strap-shaped lamina which spreads to one side. Stamens 4–5, inserted on the tube of the corolla and alternate with its lobes; filaments usually free; anthers united into a sheath surrounding the style, cells sometimes produced at the base into bristle-like points or tails. Ovary inferior, 1-celled; style slender, 2-fid, branches short or long, linear, usually semi-terete, furnished with variously placed and arranged collecting-hairs for sweeping the pollen from the anther-cells, margins stigmatic; ovule solitary, erect, anatropous. Fruit a small dry seed-like nut called an *achene*, either crowned by the persistent pappus or naked. Seed erect, with a membranous testa; albumen wanting; embryo straight, radicle short, inferior.

A vast family, by far the largest of flowering plants, comprising about 900 genera and 13,000 species. It is found in every part of the world, from the Equator to the limits of phaenogamic vegetation in the Arctic and Antarctic regions, and is equally plentiful in lowland districts and in mountainous or alpine situations. In New Zealand it constitutes rather more than one-seventh of the total number of flowering plants, a somewhat large proportion, the ratio of the whole family to the flowering plants of the world being generally estimated at about one-tenth. Although so numerous in species, the family is far from being proportionately important from an economic point of view. Edible species are singularly few, the chief being the Jerusalem and common artichoke, lettuce, and chicory. Oils are yielded by the sunflower and by *Madia sativa*. The chief medicinal plants are arnica, wormwood, and camomile. Many ornamental species are cultivated in gardens, as the various kinds of chrysanthemums, dahlias, cinerarias, asters, sunflowers, zinnias, marigolds, &c.; but on the whole it must be confessed that the majority of the plants composing the family present a weedy and unattractive appearance. Of the 30 indigenous genera 16 are widely spread; 6 extend to Australia alone (*Brachycome*, *Olearia*, *Celmisia*, *Raoulia*, *Ewartia*, *Craspedia*), but of these *Celmisia* and *Raoulia* are very feebly represented outside New Zealand. One genus (*Cassinia*) reaches South Africa as well as Australia; one (*Abrotanella*) occurs in Australia, Tasmania, and Antarctic South America. The six remaining (*Pachystegia*, *Pleurophyllum*, *Haastia*, *Leucogenes*, *Brachyglottis*, *Traversia*) are endemic. Many weeds of cultivation belonging to the family have become naturalized in the Dominion, a list of over 60 species being given in the appendix. Most of these are from the Northern Hemisphere, and descriptions of nearly all will be found in any British Flora.

Owing principally to the large size and homogeneous character of the family, very great difficulty has always been experienced in arranging the species in suitable genera and tribes, and the classification is still in an unsettled state. As there are no important differences in the flower and fruit, it becomes necessary to use minor characters, such as the shape of the style-branches; the sexual differences of the florets composing the heads; the shape of the corolla; the absence or presence of minute tails to the anthers; the various modifications of the pappus; and the minute differences in the shape and sculpture of the ripe fruit or achene. Considerable practice is required before these distinctions can be understood, and a beginner will find it no easy matter to refer the species to their proper genera. His best plan will be to induce some friend to name a few for him, and then to carefully compare these with the specific, generic, and ordinal characters given in this book, or in other works on the flora. By so doing he will insensibly acquire a practical knowledge of the characters used in distinguishing the species and genera which will ultimately enable him to identify them for himself. In using the subjoined key to the New Zealand genera it must be remembered that the minute differences in the shape of the style-branches, so largely employed to separate the tribes from one another, can only be observed in the hermaphrodite florets, the style of the female florets being very similar throughout the family.

Suborder TUBULIFLORAE.

Heads with the florets all tubular and hermaphrodite, or with the marginal ones alone ligulate and female or neuter.

Tribe 1. EUPATORIEAE.

Heads homogamous, florets all tubular, hermaphrodite. Anthers obtuse at the base. Style-branches long, obtuse, thickened upwards or club-shaped, equally minutely papillose.

Herb with opposite leaves. Achene 5-angled. Pappus of 5–10 scales or bristles .. .. 1. Ageratum.

Tribe 2. ASTEREAE.

Heads heterogamous, radiate or discoid, or with the ray deficient and then homogamous. Anthers nearly entire at the base. Receptacle naked. Style-branches flattened, produced above the stigmatic margins into a triangular or lanceolate papillose appendage.

A. Female florets ligulate, forming a more or less conspicuous ray. (Ray absent in some species of Olearia, *and dwarfed in two species of* Pleurophyllum.)

* Pappus wanting, or of minute scales or setae.

Herbs. Leaves usually radical. Pappus entirely wanting. Achene narrowed upwards into a neck or beak .. .. 2. Lagenophora.
Herbs. Leaves radical or cauline. Pappus wanting or of scale-like bristles. Achene not beaked .. .. .. 3. Brachycome.

** Pappus long, copious.

Shrub. Heads very large; scales of the involucre in very many series. Pappus-hairs uniseriate, clubbed at the tip .. .. 4. Pachystegia.
Shrubs or trees. Scales of the involucre in several series, margins scarious. Achenes nearly terete .. .. 5. Olearia.
Herbs. Leaves all radical, large, many-nerved. Heads numerous, racemed .. .. 6. Pleurophyllum.
Usually stemless herbs with radical leaves, but stems sometimes elongated and the leaves cauline. Scapes simple; heads solitary .. .. 7. Celmisia.
Branched leafy herb. Heads solitary, terminal. Achene much flattened. Style-branches with subulate tips .. .. 8. Vittadinia.

B. Female florets tubular, in many series.

Alpine woolly herbs. Stems caespitose or compacted into hard rounded masses. Heads broad, sessile .. .. .. 9. Haastia.

Tribe 3. INULEAE.

Heads heterogamous and discoid (rarely radiate in some foreign general, or homogamous through the suppression of the female florets. Anther-cells produced at the base into filiform tails. Style-branches linear, obtuse, never ending in an appendage.

A. Female florets tubular, filiform, in from 2 to many series, always outnumbering the hermaphrodite ones.

Herbs. Heads corymbose or clustered, rarely solitary. Pappus-hairs capillary, not barbellate .. .. .. 10. Gnaphalium.

B. Female florets tubular, filiform, in 1 or 2 series, sometimes altogether wanting, fewer in number than the hermaphrodite ones (sometimes outnumbering the hermaphrodite ones in Raoulia).

Herbs, usually alpine. Stems creeping or caespitose, often compacted into hard rounded masses. Heads solitary, small, sessile. Involucral bracts often white and radiating .. 11. Raoulia.
Herbs. Heads small, in dense terminal cymes subtended by broad spreading floral leaves. Pappus-hairs compressed, ribbon-like, scabrid .. .. 12. Leucogenes.
Herbs, densely clothed with silvery-white tomentum. Inflorescence corymbose, heads dioecious. Pappus-hairs scabrid at the base, claviform .. .. 13. Ewartia.

Herbs or small shrubs. Heads solitary or corymbose. Pappus-hairs various, often barbellate. Receptacle naked .. .. 14. HELICHRYSUM.
Shrubs with narrow leaves. Heads corymbose. Receptacle narrow; florets few, usually subtended by chaffy scales .. 15. CASSINIA.
Herbs. Flower-heads numerous, aggregated into a globose compound head surrounded by scarious bracts. Female florets wanting. Receptacle with scales between the florets 16. CRASPEDIA.

TRIBE 4. HELIANTHEAE.

Heads heterogamous, usually radiate, rarely discoid; or with the ray deficient and then homogamous. Receptacle with scales among the florets. Anther-cells not tailed. Style-branches truncate or furnished with an appendix. Pappus of stiff awns or short scales, never of capillary bristles.

Involucral bracts in two series: outer narrow, glandular, spreading; inner broader, erect, and enclosing the ray-florets. Pappus wanting .. .. 17. SIEGESBECKIA.
Involucral bracts in two series, about equal. Pappus of 2–4 stiff awns .. .. 18. BIDENS.

TRIBE 5. ANTHEMIDEAE.

Heads heterogamous, radiate or discoid; or with the ray deficient and then homogamous. Involucral bracts dry or scarious at the tips. Receptacle naked or paleaceous. Anther-cells without tails. Style-branches truncate. Pappus wanting, or a crown of short scales.

Herbs, usually flaccid or succulent. Heads discoid, pedunculate; female corolla short and broad. Achenes flattened, often winged .. .. 19. COTULA.
Diffuse or prostrate herb. Heads discoid, sessile, axillary. Achenes hardly flattened, 3–4-ribbed or -angled .. .. 20. CENTIPEDA.
Minute alpine herbs. Leaves entire, fleshy. Heads discoid. Female corolla tubular. Achene flattened or 4-angled .. 21. ABROTANELLA.

TRIBE 6. SENECIONEAE.

Heads heterogamous, radiate or discoid; or with the ray deficient and then homogamous. Involucral bracts usually in a single row, with a few small ones at the base. Receptacle usually naked. Anther-cells sometimes sagittate at the base, but with no true tails. Style-branches truncate or appendiculate. Pappus of capillary bristles.

Herbs. Heads discoid. Female florets very slender, filiform, in 2–3 series .. .. 22. ERECHTHITES.
Shrubs. Female florets ligulate; lamina short, furnished at the base with 1 or 2 minute lobes. Achenes terete, papillose 23. BRACHYGLOTTIS.
Herbs, shrubs, or trees. Female florets ligulate, never filiform 24. SENECIO.
Small shrub, glutinous on the leaves and involucres. Involucral scales and pappus rigid .. .. 25. TRAVERSIA.

SUBORDER LIGULIFLORAE.

Florets all ligulate and hermaphrodite, and hence homogamous. Sap milky. Consists of one tribe, CICHORIEAE.

Herb with radical leaves. Scapes simple, leafless. Pappus of tapering subulate scales, toothed or plumose above .. 26. MICROSERIS.
Branched leafy herb. Achene ribbed and transversely rugose. Pappus soft, plumose .. .. 27. PICRIS.
Herb with radical leaves (the New Zealand species). Achene terete, ribbed. Pappus of simple capillary bristles .. 28. CREPIS.
Herbs with radical leaves. Scapes simple, leafless. Achenes long-beaked. Pappus of simple capillary bristles .. .. 29. TARAXACUM.
Tall leafy succulent herbs. Achene flat, not beaked. Pappus of simple capillary bristles .. .. 30. SONCHUS.

1. **AGERATUM** Linn.

Erect herbs or rarely shrubs. Leaves opposite or the upper alternate. Heads usually corymbose, homogamous and discoid. Involucre campanulate; bracts 2–3-seriate, linear, subequal. Receptacle flat or nearly so, naked or with deciduous scales among the florets. Florets all tubular, hermaphrodite, equal; corolla-limb regularly 5-cleft. Anthers obtuse at the base. Style-branches elongate, obtuse. Achenes 5-angled. Pappus of 5 free or connate scales, or of 10–20 narrower ones.

A small genus of about 35 species, confined to America with the exception of the following one, which is universally spread through all warm regions.

Exotic

1. **A. conyzoides** *Linn. Sp. Plant.* (1753) 839.—A stout erect branching annual herb 1–3 ft. high, more or less clothed with spreading hairs. Leaves opposite, 1–3 in. long, ½–2 in. broad, ovate, obtuse or subacute, petiolate, crenate or crenate-serrate. Flower-heads small, ¼ in. diam., in dense terminal corymbs. Involucre nearly glabrous; bracts striate, acute, in about 2 rows. Florets numerous, blue or white. Achenes black, glabrous or slightly hispid. Pappus of 5 awned lanceolate scales.—*DC. Prodr.* v (1836) 108; *Benth. Fl. Austral.* iii (1866) 462; *Cheesem. in Trans. N.Z. Inst.* xx (1888) 169; *T. Kirk Students' Fl.* (1899) 256; *Cheesem. Man. N.Z. Fl.* (1906) 271.

Kermadec Islands: Abundant, *T. F. C., Miss Shakespear! W. R. B. Oliver! Wild Heliotrope; Goat-weed.*

This may have been introduced by early European settlers, or by Polynesians when they first colonized New Zealand.

See Trans 75: 196-7.

2. **LAGENOPHORA** Cass. 1818

Small perennial herbs. Leaves often all radical. Scapes slender, unbranched. Heads solitary, small, heterogamous. Involucre short, almost hemispherical; bracts in about 2 rows, with dry or scarious margins. Receptacle convex, naked. Ray-florets in 1–3 series, female, fertile, ligulate or rarely short and tubular; ligule usually white. Disc-florets numerous, hermaphrodite, tubular, with a broad 5-toothed limb. Anthers obtuse at the base. Style-branches of the disc-florets long, flattened, with lanceolate or triangular tips. Achenes compressed, abruptly contracted at the top into a more or less distinct beak; those of the disc-florets often narrower and sterile. Pappus wanting.

A small genus of about 18 species, mainly found in Australia and New Zealand but with outlying species in eastern Asia, the Sandwich Islands, and extra-tropical South America.

Glabrate or pilose. Leaves mostly radical; petioles slender; blade orbicular or broadly oblong. Heads ¼–½ in. diam. Achenes small, nearly straight .. .. 1. *L. pumila.*

Glabrate or pilose, slender. Leaves mostly radical; petioles slender; blade orbicular or oblong. Heads ⅛–⅓ in. diam. Achenes larger, curved or falcate .. .. 2. *L. petiolata.*

Glabrate or pilose, slender. Leaves all radical; blade obovate-cuneate. Heads ⅙–⅛ in. diam. Achenes straight or nearly so .. 3. *L. cuneata.*

Scaberulous. Leaves mostly cauline; petioles slender; blade oblong-spathulate. Heads ¼–½ in. diam. .. .. .. 4. *L. Barkeri.*

Glabrate or pilose. Leaves mostly cauline; petioles slender; blade ovate. Achene oblanceolate .. .. 5. *L. purpure*

Softly hirsute. Leaves all radical; petiole broad, flat; blade obovate, pinnatifid. Heads $\frac{1}{4}$–$\frac{1}{2}$ in. diam. .. .. .. 6. *L. pinnatifida.*
Leaves hirsute, all radical; petioles short, broad; blade oblong-spathulate. Heads $\frac{1}{4}$–$\frac{1}{3}$ in. diam. Achene glabrous .. .. 7. *L. lanata.*

L. linearis Petrie in Trans. N.Z. Inst. xxv (1893) 471 is *Brachycome linearis* Petrie. *L. emphysopus* Hook. f., an Australian species, has become naturalized on Banks Peninsula and near Wellington. It has the habit, fleshy roots, and hirsute leaves of *L. lanata*, but can at once be distinguished by the short stout scapes and almost tubular ray-florets.

(Forst. f.)

1. L. pumila *Cheeseman in Subantarctic Is. N.Z.* ii (1909) 412.—
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orbicular or
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DC. Prodr. v (1836) 307; *A. Cunn. Precur.* (1836) ii. 130; *Hook. f. Fl. Nov. Zel.* i (1853) 125; *Handb. N.Z. Fl.* (1864) 137; *T. Kirk Students' Fl.* (1899) 256. Calendula pumila *Forst. f. Prodr.* (1786) 57. Microcalia australis *A. Rich. Fl. Nouv. Zel.* (1832) 231. see Sub. II 412 T. 75: 196.

Very small. $\frac{1}{2}$–2 in. high. Leaves with
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1. **AGERATUM** Linn.

Erect herbs or rarely shrubs. Leaves opposite or the upper alternate. Heads usually corymbose, homogamous and discoid. Involucre campanulate; bracts 2–3-seriate, linear, subequal. Receptacle flat or nearly so, naked or with deciduous scales among the florets. Florets all tubular, hermaphrodite, equal; corolla-limb regularly 5-cleft. Anthers obtuse at the base. Style-branches elongate, obtuse. Achenes 5-angled. Pappus of 5 free or connate scales, or of 10–20 narrower ones.

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Ageratum conyzoides, Linn.

not native to N.Z. see T.N.Z.I.

vol. 57, p. 61. (Ckn. & Allan).

Exotic 1. **A.**
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acute, in
glabrous or slightly hispid. Pappus [illegible]

see Cheesm. : 42: 174.

Prodr. v (1836) 108; *Benth. Fl. Austral.* iii (1866) 462; *Cheesem. in Trans. N.Z. Inst.* xx (1888) 169; *T. Kirk Students' Fl.* (1899) 256; *Cheesem. Man. N.Z. Fl.* (1906) 271.

Simpson, G. - Notes and Descriptions of New Species, Trans. Roy. Soc. N.Z., V.75, p.196. see

Lagenophora pumila Forst.f.

The species occurs in a multiplicity of forms differing one from the other in the leaves being glabrous or to some more or less extent hairy, green or purplish, smooth or somewhat rugose, their margins closely or remotely toothed, sometimes crenate, and the flowers of some forms larger than others. On open ground the leaf rosettes form closely matted patches, much in the manner of Wahlenbergia albomarginata in similar situations. Kirk's species L. purpurata and L. barkeri, with L. multidentata S Simpn. et Thmn., are varietal forms of the jordanon, but described from elongated states.

L. pumila var. purpuratea = L. purpuratea T. Kirk in Stud. Flor. (1899) 257.

L. pumila var. barkeri = L. barkeri T.Kirk in Stud. Flor. (1899) 257.

L. pumila var. multidentata = L. barkeri T. Kirk var. multidentata Simpn. et Thmn. in Trans. Roy. Soc. N.Z. Vol.73 (1943) 167.

Softly hirsute. Leaves all radical; petiole broad, flat; blade obovate, pinnatifid. Heads ¼–½ in. diam. .. .. .. 6. *L. pinnatifida.*
Leaves hirsute, all radical; petioles short, broad; blade oblong-spathulate. Heads ¼–⅓ in. diam. Achene glabrous .. .. 7. *L. lanata.*

L. linearis Petrie in Trans. N.Z. Inst. xxv (1893) 471 is *Brachycome linearis* Petrie. *L. emphysopus* Hook. f., an Australian species, has become naturalized on Banks Peninsula and near Wellington. It has the habit, fleshy roots, and hirsute leaves of *L. lanata*, but can at once be distinguished by the short stout scapes and almost tubular ray-florets.

1. **L. pumila** *Cheesem. in Subantarctic Is. N.Z.* ii (1909) 412.—A small daisy-like herb, either tufted or with creeping and rooting stolons furnished with tufts of radical leaves at the nodes. Leaves all radical or cauline, 1½–2 in. long; petiole long, slender; blade ½–1 in., orbicular or orbicular-oblong to obovate, obtuse, narrowed into the petiole, coarsely crenate-dentate or almost lobed, almost glabrous or more or less hirsute. Scape 1–6 in. long, slender, naked or with 1–3 minute linear bracts. Heads ¼–½ in. diam.; involucral bracts linear, acute; margins thin, scarious, entire or finely jagged. Ray-florets numerous; ligules white, revolute. Achenes small, linear-obovate, straight or very slightly curved, abruptly narrowed into a short hardly viscid beak; margins thickened.—L. Forsteri *DC. Prodr.* v (1836) 307; *A. Cunn. Precur.* (1838) n. 436; *Hook. f. Fl. Nov. Zel.* i (1853) 125; *Handb. N.Z. Fl.* (1864) 137; *T. Kirk Students' Fl.* (1899) 256. Calendula pumila *Forst. f. Prodr.* (1786) 57. Microcalia australis *A. Rich. Fl. Nouv. Zel.* (1832) 231.

Var. **minima** *T. Kirk Students' Fl. l.c.* 257.—Very small, ½–2 in. high. Leaves with the petiole ½–2 in. long, membranous, dentate, sometimes lobed or pinnate at the base. Scapes filiform. Heads small.—L. petiolata *var.* minima *Cheesem.*

Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands, Auckland Islands, Campbell Island, Antipodes Island: Abundant throughout, ascending to 3500 ft. *Papataniwhaniwha; Native Daisy.* October–February.

A variable plant, very closely connected with the three following species. It is one of the few plants that range throughout the entire Dominion, from the Kermadec Islands southwards. The closely allied *L. nudicaulis* Dusén (*L. Commersonii* Cass.) represents the species in South America, ranging from Chile to the south of Fuegia and the Falkland Islands.

2. **L. petiolata** *Hook. f. Fl. Nov. Zel.* i (1853) 125.—Habit of *L. pumila* but smaller and much more slender. Leaves usually radical, spreading, ½–1½ in. long; petiole slender, ½ the length or more; blade variable in shape, oblong to orbicular, sometimes broader than long, obtuse, rather thin, acutely coarsely toothed with the teeth apiculate, more or less hairy on both surfaces, often purplish beneath. Scape very slender, strict, 2–6 in. long, usually hirsute. Heads small, ⅕–⅓ in. diam.; involucral bracts linear, acute, often purplish at the tips; margins scarious. Ray-florets numerous; ligule very narrow, revolute. Achenes rather longer and more turgid than in *L. pumila*, linear-obovate, curved or falcate, slightly glandular above, narrowed into a rather long beak; margins thickened.—*Handb. N.Z. Fl.* (1864) 137; *T. Kirk Students' Fl.* (1899) 257; *Cheesem. Man. N.Z. Fl.* (1906) 273. L. strangulata *Col. in Trans. N.Z. Inst.* xxii (1890) 471.

North and South Islands, Stewart Island: Not uncommon from the Upper Thames and Waikato southwards, ascending to 4000 ft. November–January.

Very closely allied to *L. pumila*, but separated by the more slender habit, smaller and thinner leaves, smaller heads with shorter and narrower rays, and longer and narrower curved achenes.

3. **L. cuneata** *Petrie in Trans. N.Z. Inst.* li (1919) 106.—Stems tufted at the base, usually putting out short spreading stolons. Leaves mostly radical, few or many, $\frac{1}{4}$–$1\frac{1}{2}$ in. long including the petiole; blade broad or narrow obovate-cuneate, gradually narrowed into a long petiole, usually furnished with 1 or 2 pairs of coarse teeth towards the top, rarely entire, more or less coriaceous; margins thickened; upper surface and petioles clothed with long whitish hairs, under-surface often nearly glabrous. Culms 3–6 in. high, slender, erect, stiff and wiry, almost glabrous below, finely pubescent above; bracteoles 1–3, minute. Heads small, $\frac{1}{6}$–$\frac{1}{5}$ in. diam.; involucral scales linear-obovate, subacute; margins scarious, purplish at the tips when young. Ligules of the ray white. Achenes linear-obovate, slightly curved; beak short, oblique.

North and South Islands: Base of Tongariro and Ruapehu, *T. F. C.*, *H. Carse!* not uncommon. Marlborough—Pelorus Valley, *J. H. Macmahon!* Nelson—Clarence Valley, *T. F. C.*; Hanmer Plains, *Petrie!* Canterbury—Abundant in the Hooker and Tasman Valleys, *T. F. C.*, *Petrie.* Otago—Not uncommon throughout, *Petrie!* 500–3500 ft. December–February.

This species was apparently included by Hooker in his conception of *L. petiolata*, but it is easily distinguished from that plant by the smaller size, more slender and stiffer habit, by the narrower and more coriaceous obovate-cuneate leaves, and by the smaller heads.

4. **L. Barkeri** *T. Kirk Students' Fl.* (1899) 257.—Stems leafy, slender, erect, 3–9 in. high. Leaves cauline, usually gradually diminishing in size upwards, 1–2 in. long; petiole about $\frac{1}{2}$ the length; blade obovate-spathulate to narrow oblong-spathulate, obtuse or subacute, gradually narrowed into the petiole, coarsely crenate-dentate, scaberulous on both surfaces. Scape shorter or longer than the leafy part of the stem, scaberulous and pilose. Head $\frac{1}{3}$–$\frac{1}{2}$ in. diam.; involucral bracts linear, acute, thin, often purplish. Ray-florets numerous; ligules white, revolute. Ripe achenes not seen.—*Cheesem. Man. N.Z. Fl.* (1906) 273.

South Island: Nelson—*Sphagnum* swamps in the Upper Clarence Valley and Lake Tennyson, *T. F. C.*, *R. M. Laing!* Canterbury—By the Porter River, *T. Kirk*, *J. D. Enys*; Craigieburn Mountains, *Cockayne!* Mount Arrowsmith, *Cockayne* and *R. M. Laing*; Cass River, near Lake Tekapo, *T. F. C.* Otago—Clinton Valley, *Cockayne!* 1500–3500 ft. December–January.

Far too closely allied to *L. pumila*, from which it only differs in the leafy stems, narrower scaberulous leaves, and (according to Kirk) in the linear short-beaked achenes.

5. **L. purpurea** *T. Kirk Students' Fl.* (1899) 257.—"Stems leafy below, naked above, erect, slender, grooved, 4–6 in. high, pubescent or puberulous. Leaves (including the petiole) $1\frac{1}{2}$ in. long, membranous, ovate, radical and cauline, rather distant, truncate at the base, rounded at the apex, serrate or crenate-serrate, teeth apiculate, pubescent on both surfaces, ciliate, purple beneath. Heads $\frac{1}{3}$–$\frac{1}{2}$ in. diam.; involucral bracts in about 3 rows, linear, acute, with scarious margins, keeled, midrib distinct, often tipped with purple. Achenes oblanceolate, compressed, with a rather long beak and thin margins."

South Island: Otago—Catlin's River, *T. Kirk.*

This appears to be founded on three immature specimens in Mr. Kirk's herbarium, and in the absence of additional information I have reproduced his description. It is probably nothing more than a large state of *L. petiolata.*

Christchurch, in the Herbarium Plant Research Bureau, Wellington.

The diversiform, greyish green, glandular hairy and somewhat fleshy leaves separate the species immediately from others of the genus.

Simpson & Thomson - Notes on Some N.Z. Plants, Trans. Roy. Soc. N.Z. Vol.73, Pt.3, pp.167-169.

COMPOSITAE

Lagenophora barkeri T.Kirk var. multidentata var. nov.

A typo differt foliis 2-7 cm. longis, 1-1.5 cm. latis, obovatis vel obovato-spathulatis, obtusis, glabris vel pilis paucis brevibus; laminis sinuatis, vel arte irregulariterque leviter dentatis vel lobatis, lobis breviter apiculatis ciliolatisque.

A slender plant with one or more long slender stems from the base; stems one flowered, 10-12 cm. or more long including the scape, straggling, glabrous, leafy towards the tip. Leaves alternate, 2-7 cm. long, 1-1.5 cm. broad, obovate or obovate spathulate, rounded at the tip, narrowed to the petiole, glabrous or with a few short hairs; petiole as long as the blade; bladr sinuate, or closely and irregularly shallow toothed, or lobed and the lobes shortly apiculate, ciliolate at the margins. Scape 5-8 cm. long, glabrous or with a few hairs, pilose under the head, with or without bracts. Head ± 6 mm. diam., involucral bracts hyaline, linear, acute, with a dark nerve; ray florets numerous. Ripe achenes not seen.

Habitat: Grass covered openings or edges in rain forest.

Type specimen from the Freeman River Valley, Lake Manapouri, in the Herbarium Plant Research Bureau, Wellington.

A common species in the Fiord Botanical District, straggling amongst grass in moist openings in forest. L. barkeri has scaberulous leaves with their margins distinctly but sparsely toothed.

6. **L. pinnatifida** *Hook. f. Fl. Nov. Zel.* i (1853) 126. — Softly hairy or pilose in all its parts. [illegible]

Simpson, G. - Notes and Descriptions of New Species, Trans. Roy. Soc. N.Z., V.75, p.197.

Brachycome montana sp.nov.

Herba rhizomate breve, 2-3 mm. diam., conferte ramosa. Folia radicalia 2-3 cm. longa, 4-8 mm. lata, linearo vel obovato-spathulata, aliquantulum carnosa, undique dense glanduloso-strigosa. Petiolus lamina aequans vel ad duplo longior, supra plana sulcataque, subtus convexa. Scapus 4-6 cm. longus, aliquantulum crassus, nudus vel bractea unica, acuta, glanduloso-strigosa praeditus, capitulis 1 cm. diam. Phyllaria 3 seriata, 5 mm. longa, linearo-oblonga, acuta, glanduloso-pilose, apece scariosa. Flores radii 5 mm. longi, 2 seriati, linearo-obovati, valde recurvati; flores disci numerosi, flavescentes. Achaenia.

Rootstock short, 2-3 mm. diam., with many slender roots, branching closely to form small dense clumps. Leaves radical, 2-3 cm. long, 4-8 mm. broad, linear obovate-spathulate, rather fleshy, greyish green, surfaces and margins closely dotted with small stiff glandular hairs; petiole as long or twice as long as the blade, flat above and grooved, rounded beneath; blade differing in shape and in the division of its margins, rounded or narrowed to the petiole, sometimes almost entire, more usually with 2-7 irregularly disposed, conspicuous, rounded lobes. Scapes 4-6 cm. long, rather stout, pale brown, naked or with a single linear, acute bract, glandular hairy as the leaves. Heads 1 cm. diam. involucral bracts 5 mm. long, in 3 series, linear oblong, acuto, glandular hairy, with scarious tips; ray florets 5 mm. long, in 2 series, linear obovate, rounded at the tip, much recurved, disc florets numerous, yellowish.

Habitat: Grassland.

Type specimen from Mount Cardrona, Central Otago, collected by Mr. D. Leigh and cultivated by Mr. W. B. Brockie at the Botanic Gardens, Christchurch, in the Herbarium Plant Research Bureau, Wellington.

The diversiform, greyish green, glandular hairy and somewhat fleshy leaves separate the species immediately from others of the genus.

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6. **L. pinnatifida** *Hook. f. Fl. Nov. Zel.* i (1853) 126. — Softly hairy or pilose in all its parts. Leaves all radical, spreading, 1–3 in. long, narrow obovate-oblong or obovate-spathulate, obtuse at the tip, narrowed into a long broad petiole, membranous, deeply crenate-lobed or almost pinnatifid; margins ciliate. Scapes 3–10 in. long, slender. Heads $\frac{1}{4}$–$\frac{1}{2}$ in. diam.; involucral bracts linear, acute, pubescent. Ray-florets numerous; ligules narrow, revolute. Achenes compressed, obliquely linear-obovate, narrowed to the base, suddenly contracted at the tip into a short straight neck, more or less glandular-pubescent; margins thickened.—*Handb. N.Z. Fl.* (1864) 137; *T. Kirk Students' Fl.* (1899) 258; *Cheesem. Man. N.Z. Fl.* (1906) 274. L. pinnatifida *var.* hirsutissima *Cockayne in Trans. N.Z. Inst.* xlviii (1916) 197.

T. 71:95.

Var. **tenuifolia** *Cockayne l.c.* — Leaves thinner, much less deeply cut; tomentum less dense, and hairs shorter.

North Island: Upper part of Wairoa River (Hawke's Bay), *T. Kirk;* inland Patea, *Colenso!* South Island: Nelson—Mount Arthur Plateau, *F. G. Gibbs!* Wairau Valley, *T. Kirk! T. F. C.* Marlborough — *Rough.* Canterbury—Banks Peninsula, *R. M. Laing;* Kowai Bush, *Cockayne;* Upper Waimakariri, *T. F. C.* Otago—*Lindsay, Buchanan, Petrie! Cockayne!* Var. *tenuifolia:* North Island—Tauroa (Reef Point, near Ahipara), *H. Carse! H. B. Matthews!* sandhills near Helensville, *T. F. C.* Sea-level to 3000 ft. December–January.

A handsome little plant. According to Hooker, it is very closely allied to the Australian *L. Billardieri.*

7. **L. lanata** *A. Cunn. Precur.* (1838) n. 437.—Root-fibres stout, fleshy, almost tuberous. Leaves numerous, all radical, densely tufted, 1–1$\frac{1}{2}$ in. long, oblong- or obovate-spathulate, obtuse or subacute, narrowed into a rather short broad petiole, coriaceous, coarsely and irregularly crenate-dentate, both surfaces hirsute or villous with copious soft hairs. Scapes 2–7 in. long, slender, wiry, erect, glabrous or nearly so, naked or with a few minute linear bracts. Heads $\frac{1}{4}$–$\frac{1}{3}$ in. diam.; involucral bracts linear, obtuse or subacute, glabrous, purple-tipped; margins scarious. Ray-florets numerous; ligules short, revolute. Achenes quite smooth, slightly falcate, compressed, narrowed at the base, suddenly contracted at the top into a short curved neck; margins thickened.—*Raoul Choix* (1846) 45; *Hook. f. Fl. Nov. Zel.* i (1853) 126; *Handb. N.Z. Fl.* (1864) 137; *T. Kirk Students' Fl.* (1899) 258; *Cheesem. Man. N.Z. Fl.* (1906) 274.

North Island: Auckland—Open clay hills from Mongonui County to the Auckland Isthmus. Near Kaitaia and Fairburn, *H. Carse!* hills between Mangonui and Whangaroa, *T. F. C.;* between the Waitangi and Kerikeri Rivers, *A. Cunningham, Buchanan!* Whangarei, *T. F. C.;* Titirangi and northern shore of the Manukau Harbour, *T. F. C.* November–January.

Easily distinguished by the hirsute leaves and glabrous scapes and achenes.

3. **BRACHYCOME** Cass. 1825

Small perennial herbs; either tufted with radical leaves and 1-headed scapes, or the stems branched, elongated, and clothed with alternate cauline leaves. Heads heterogamous, usually radiate. Involucre hemispherical or nearly so; bracts in about 2 series, with scarious margins. Receptacle convex or conical, naked. Ray-florets in 1 series, numerous, female, ligulate. Disc-florets numerous, hermaphrodite, tubular, limb more or less dilated, 5-toothed. Anthers obtuse at the base. Style-branches of the disc-florets flattened, with lanceolate or triangular tips.

Achenes compressed, with winged margins, or thick and obtusely 4-angled. Pappus a ring of short scale-like bristles or altogether wanting.

The genus has its headquarters in Australia, where there are nearly 50 species. In addition to those, and the five following found in New Zealand, there is one from tropical South Africa and another from Assam. The New Zealand species are much in want of careful study and re-examination with larger sets of specimens than have yet been obtained. This is particularly the case with *B. Sinclairii*, *B. odorata*, and *B. Thomsoni*, three species which are at present in a very unsatisfactory condition.

* Stemless. Leaves all radical.

Minute, perfectly glabrous. Leaves narrow-linear, ¼–1 in. long. Heads $\frac{1}{10}$ in. diam. .. .. 1. *B. linearis.*
Leaves ½–1½ in. long, narrow linear-spathulate, closely and uniformly pinnatifid .. .. 2. *B. pinnata.*
Leaves ½–3 in. long, oblong- or obovate-spathulate, rarely narrower, entire toothed or lobed .. .. 3. *B. Sinclairii.*

** Stems branched from the base. Leaves radical and cauline.

Stems 2–4 in. Leaves few, ½–1 in., oblong-spathulate, unequally 3–8-lobed. Heads ¼–⅓ in. .. .. 4. *B. odorata.*
Stems 3–12 in. Leaves numerous, 1–3 in., oblong-spathulate, coarsely toothed or lobed. Heads ½ in. diam. .. .. 5. *B. Thomsoni.*

B. simplicifolia J. B. Armstr. in Trans. N.Z. Inst. xiii (1881) 338 is quite unknown to me, and there are no specimens in any public collection in the Dominion. It probably does not belong to the genus.

B. linearis (Petrie) Druce 1916 : 610. *B. longiscapa* ?

1. **B. linearis** *Petrie in Trans. N.Z. Inst.* li (1919) 106.—A minute tufted plant ½–1½ in. high, perfectly glabrous in all its parts. Leaves numerous, all radical, ¼–1 in. long, about $\frac{1}{25}$ in. wide, broadest towards the tip, obtuse or subacute, narrowed to the base, which is slightly broader and sheathing, flat, quite entire. Scapes 2–5, slender, strict, naked, elongating in fruit, about twice as long as the leaves. Heads solitary, small, $\frac{1}{15}$–$\frac{1}{10}$ in. diam.; involucral bracts about 8, oblong-ovate, with broad purple scarious margins. Ray-florets few; ligules short, white, revolute. Achenes very small, pale, compressed, linear-obovate, obtuse, quite smooth and glabrous. Pappus wanting.—B. lineata *T. Kirk Students' Fl.* (1899) 259. Lagenophora linearis *Petrie in Trans. N.Z. Inst.* xxv (1893) 271.

South Island: Otago—Grassy flats near Lake Te Anau, *Petrie!* January–February.

Trans 75 197

A curious little species, quite unlike any other.

2. **B. pinnata** *Hook. f. Handb. N.Z. Fl.* (1864) 138.—Rhizome stout, creeping, branched, ascending at the tips. Leaves radical, ½–1½ in. long, linear or narrow linear-spathulate, deeply and closely pinnatifid; segments broadly oblong or rounded, coriaceous, entire, flat or concave beneath, glabrous or minutely glandular-pubescent. Scapes 2–6 in. long, slender, naked, glandular-pubescent. Heads ⅓ in. diam.; involucral bracts oblong, pubescent; margins purple, scarious and often jagged. Achenes obovate, glabrous; margins thickened. Pappus of very minute scales.—*T. Kirk Students' Fl.* (1899) 275; *Cheesem. Man. N.Z. Fl.* (1906) 276. B. radicata *var.* β *Hook. f. Fl. Nov. Zel.* i (1853) 127.

T. 72 : 324

South Island: Nelson—Lake Tennyson, *R. M. Laing!* Canterbury—In several localities on the Plains; near Burnham, *T. Kirk!* between Springfield and the Kowai River, *T. F. C.;* near Ashburton, *H. H. Allan!* Mount Arrowsmith, *Cockayne* and *R. M. Laing.* Stewart Island: *Lyall* (Handb.). December–January.

Although this has a very different appearance from the ordinary state of *B. Sinclairii*, some varieties of that plant approach it so closely as to be almost indistinguishable.

Achenes compressed, with winged margins, or thick and obtusely 4-angled. Pappus a ring of short scale-like bristles or altogether wanting.

The genus has its headquarters in Australia, where there are nearly 50 species. In addition to those, and the five following found in New Zealand, there is one from tropical South Africa and another from Assam. The New Zealand species are much in want of careful study and re-examination with larger sets of specimens than have yet been obtained. This is particularly the case with *B. Sinclairii*, *B. odorata*, and *B. Thomsoni*, three species which are at present in a very unsatisfactory condition.

* Stemless. Leaves all radical.

Minute, perfectly glabrous. Leaves narrow-linear, $\frac{1}{4}$–1 in. long. Heads $\frac{1}{10}$ in. diam. .. .. 1. *B. linearis.*

Leaves $\frac{1}{2}$–$1\frac{1}{2}$ in. long, narrow linear-spathulate, closely and uniformly pinnatifid .. .. 2. *B. pinnata.*

Leaves $\frac{1}{2}$–3 in. long, oblong- or obovate-spathulate, rarely narrower, 2. *B. Sinclairii*

Simpson, G. - Notes and Descriptions of New Species, Trans. Roy. Soc. N.Z., V.75, p.197.

Brachycome linearis (Petrie) T.Kirk. Bruce 1916 610 ?

Flowering specimens of this small genus were collected in November, 1943, from moist, green, matted vegetation on the shore of Lake Te Anau, some 100 m. southward of the hostel.

Petrie described the habitat as "grassy flats" but its companion plants are Carex gaudichandiana, Centella asiatica, Cotonia australasica, Epilobium nerteroides, Gnaphalium paludosum, Haloragis micrantha, Hydrocotyle tripartita, Muhlenbeckia axillaris, Plantago triandra, Pratia angulata, small unidentifiable states of Cotula, Gunnera, Juncus, Ranunculus and Viola and exotics in Linum catharticum and Prunella vulgaris.

ing, branched, ascending at the tips. Leaves radical, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, linear or narrow linear-spathulate, deeply and closely pinnatifid; segments broadly oblong or rounded, coriaceous, entire, flat or concave beneath, glabrous or minutely glandular-pubescent. Scapes 2–6 in. long, slender, naked, glandular-pubescent. Heads $\frac{1}{3}$ in. diam.; involucral bracts oblong, pubescent; margins purple, scarious and often jagged. Achenes obovate, glabrous; margins thickened. Pappus of very minute scales.—*T. Kirk Students' Fl.* (1899) 275; *Cheesem. Man. N.Z. Fl.* (1906) 276. B. radicata *var.* β *Hook. f. Fl. Nov. Zel.* i (1853) 127.

T. 72:324

South Island: Nelson—Lake Tennyson, *R. M. Laing!* Canterbury—In several localities on the Plains; near Burnham, *T. Kirk!* between Springfield and the Kowai River, *T. F. C.;* near Ashburton, *H. H. Allan!* Mount Arrowsmith, *Cockayne* and *R. M. Laing.* Stewart Island: *Lyall* (Handb.). December–January.

Although this has a very different appearance from the ordinary state of *B. Sinclairii*, some varieties of that plant approach it so closely as to be almost indistinguishable.

Simpson & Thomson - Notes on Some N.Z. Plants, Trans. Roy. Soc. N.Z., V.73, pt.33, pp.167-169.

Brachycome longiscapa sp.nov.

Herba parva radicibus gracilibus apice in capita plura congesta ramosa. Folia radicalia 4-6 cm. longa, 8-12 mm. lata, spathulata vel anguste spathulata, aliquantulum carnosa, minute pubescentes, atro-viridia; petiolis crassis, supra applanatis, infra convexis, basi dilatatis, laminis obovatis, obtusis, in petiolum angustatis, integris vel marginibus irregulariter lobatis vel pinnatifida, nervo medio supra immerso, subtus elevato. Scapi stricti 10-20 cm. longi, graciles, pallide brunnei vel purpurei, basi glabri, apice versus dense glanduloso-puberuli. Capitula 1-5 cm. diam. phyllaribus 4 mm. longis, oblongis, glanduloso-pilosis, marginibus scariosis. Ligulae 8 mm. longae, numerosae, linari-obovati; flores disci virides. Achaenia obovata, compressa, pappi squamis minutis.

Rootstock short, stout, with many slender roots, branching closely to form small dense clumps. Leaves radical, 4-6 cm. long, 8-12 mm. broad, spathulate or linear spathulate, rather fleshy, darkish green, minutely or mealy pubescent; petiole stout, flattened above, rounded beneath, widened at the base, as long as or longer than the blade; blade obovate, rounded or blunt at the tip, narrowed to the petiole, entire or the margin very irregularly lobed or toothed or pinnatifid, the midrib sunken above, prominent beneath. Scapes strict, long, 10-20 cm., slender, pale brown or purplish, naked, glabrous at the base, closely covered towards the tip with short, stout, glandular hairs. Heads 1.5 cm. diam involucral bracts 4 mm. long, in 2 series, oblong reddish, glandular hairy, with the margins scarious, rough and blackened; ray florets 8 mm. long, numerous, linear obovate, obtuse; disc florets green. Achenes obovate, compressed, with minute pappus scales.

Habitat: Grassland.

Type specimen from the Upper Shag Valley, near Kyeburn, in the Herbarium Plant Research Bureau, Wellington.

A common grassland plant in the valleys of the Shag and Waitaki Rivers and their tributaries, Lindis Pass, L. Pukaki, etc. The irregularly margined, minutely pubescent, darkish green leaves, and the long, slender scapes are unlike those of any other of the other species.

B. montana Simpso. Trans. 75: 197. Mt. Cardrona

Simpson & Thomson - Notes on Some N.Z. Plants, Trans. Roy. Soc. N.Z. Vol.73, Pt.33, pp.167-169.

Brachycome humile sp.nov.

Herba parva, foliis radicalibus, 1-2 cm. longis lineari-spathulatis, apice versus 1 mm. latis, integris, vel apice versus denticulis parvis paucis minutis, aliquatenus carnosis, glanduloso-maculatis, vel minute glanduloso-pubescentibus. Scapi ± 3 cm. longi, fere filiformes, infra glabri, superne glanduloso-pilosi. Capitulum solitarium ± 6 mm. diam. phyllaribus 9-10 lanceolatis, marginibus subpurpureis, scariosis. Ligulae ± 12, phyllaribus duplo longiores, oblongae, obtusae, basi pilosae. Achaenia obovoidea, leviter compressa, paucis rigidis pilis praedita, squamas parvas gerentes.

A very small tufted plant. Leaves radical, 1-2 cm. long, linear spathulate, 1 mm. broad at the tip, entire, or with 1-2 notches on one or both margins towards the tip, rather fleshy, glabd dotted or minutely glandular pubescent. Scapes 1 or more from the base, + 3 cm. long, almost filiform, glabrous below, with glandular hairs at the tips; heads solitary, ± 6 mm. diam; involucral bracts 9-10, lanceolate; margins purplish, scarious. Ray florets about 12, twice as long as the involucral bracts, oblong, obtuse, yellowish and pilose at the base. Achenes obovate, slightly compressed, with a few stiff hairs; pappus of small scales.

Habitat: Snow hollows.

Type specimen from the summit of Rock and Pillar Range, Otago, in the Herbarium Plant Research Bureau, Wellington.

Smaller in size than B. linearis and differing by larger flowers, longer ray florets, by the hairs on the corolla and achenes and the distinct pappus scales.

about ½ in. diam.; involucral bracts oblong or oblong-ovate, obtuse, with purple tips. Ray-florets usually numerous, but sometimes wanting in reduced states; rays white, spreading. Achenes linear-clavate, densely glandular-pubescent; margins thickened. Pappus of minute bristly scales. —*T. Kirk Students' Fl.* (1899) 260; *Cheesem. Man. N.Z. Fl.* (1906) 277.

Trans.

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Habitat: Grassland.

Type specimen from the Upper Shag Valley, near Kyeburn, in the Herbarium Plant Research Bureau, Wellington.

A common grassland plant in the valleys of the Shag and Waitaki Rivers and their tributaries, Lindis Pass, L. Pukaki, etc. The irregularly margined, minutely pubescent, darkish green leaves, and the long, slender scapes are unlike those of any other of the other species.

B. montana Sinfo. Trans. 75: 197. N. Cantrons

3. **B. Sinclairii** *Hook. f. Handb. N.Z. Fl.* (1864) 137.—An exceedingly variable perennial herb 1–12 in. high, glabrous or more or less glandular-pubescent. Rhizome short, stout, branched, ascending at the tip. Leaves all radical, ½–3 in. long, oblong- or obovate-spathulate to linear-spathulate, rounded at the tip, gradually narrowed into a rather broad flat petiole, coriaceous or almost membranous, sometimes slightly fleshy, entire or variously toothed or lobed or even pinnatifid. Scapes 1 or several, strict, 1–12 in. high, glabrous or more or less glandular, naked or with 1–2 minute linear bracts. Heads very variable in size, ⅓–¾ in. diam.; involucral bracts oblong to linear, obtuse or subacute, glabrous or glandular-pubescent; margins thin, purplish or whitish, usually jagged. Ray-florets numerous; ligules very variable in length. Achenes much compressed, narrow-obovate, usually glabrous, margins slightly thickened.—*T. Kirk Students' Fl.* (1899) 260; *Cheesem. Man. N.Z. Fl.* (1906) 276.

North Island: Mountainous districts from the East Cape southwards, but rare and local. South Island: Abundant in mountain districts throughout. 1000–6000 ft. December–February.

Very variable in the size and shape of the leaves, and in their being entire, toothed, or lobulate, or even pinnatifid; but the variations are not constant, and entire and lobulate leaves can often be found on the same plant. The heads also vary greatly in size.

4. **B. odorata** *Hook. f. Handb. N.Z. Fl.* (1864) 138.—Rhizome stout, creeping, branched, ascending at the tips. Stems 2–4 in. long, erect or ascending, branched from the base, more or less pubescent or glandular, as are the leaves, scapes, and involucres. Leaves few, ½–1 in. long, including the slender petiole; blade oblong- or obovate-spathulate, obtuse, deeply and unequally 3–8-lobed. Peduncles terminating the branches, 1–3 in. long, rather slender. Heads ¼–⅓ in. diam.; involucral bracts oblong, obtuse. Ray-florets with short ligules. Achenes linear-clavate, densely glandular-pubescent.—*T. Kirk Students' Fl.* (1899) 260; *Cheesem. Man. N.Z. Fl.* (1906) 276. B. radicata *Hook. f. Fl. Nov. Zel.* i (1853) 127 (*in part*).

North Island: Hawke's Bay—Tutira, *H. Guthrie-Smith;* Kaweka Mountains, *Tryon!* Wellington—Kaimanawa Mountains, *Colenso! B. C. Aston!* Ruahine Mountains, *B. C. Aston.* *Ronui.*

I am inclined to think that this is not separable from *B. Thomsoni;* but all the New Zealand Brachycomes require careful study in the field. Mr. Colenso states that the plant was prized by the Maoris on account of its fragrance, and that the flowers were often strung like daisies and worn round the neck.

5. **B. Thomsoni** *T. Kirk in Trans. N.Z. Inst.* xvi (1884) 372, t. 27.—Rhizome stout, creeping, branched. Stems 3–12 in. long, stout, branched from the base, decumbent or ascending, densely glandular-pubescent, as are the leaves, scapes, and involucres. Leaves numerous, radical and cauline, 1–2 in. long, oblong- or obovate-spathulate, obtuse, narrowed into a very broad flat petiole, coarsely bluntly toothed or lobed or almost pinnatifid. Peduncles terminating the branches, 3–6 in. long or more, stout, somewhat rigid, naked or with a solitary linear bract. Heads about ½ in. diam.; involucral bracts oblong or oblong-ovate, obtuse, with purple tips. Ray-florets usually numerous, but sometimes wanting in reduced states; rays white, spreading. Achenes linear-clavate, densely glandular-pubescent; margins thickened. Pappus of minute bristly scales.—*T. Kirk Students' Fl.* (1899) 260; *Cheesem. Man. N.Z. Fl.* (1906) 277.

Var. **membranifolia** *T. Kirk l.c.* 261.—More slender and less branched, and not so glandular. Leaves 1–3 in. long, membranous; petioles longer and more slender.

Var. **polita** *Cheesem.*—Usually glabrous, except the peduncles. Stems very slender, simple or sparingly branched, leafy at the base. Leaves 1–3 in., very thin and membranous. Heads rather smaller.—B. polita *T. Kirk Students' Fl.* (1899) 261.

South Island: South-east Otago, not uncommon in coastal districts from Oamaru southwards. Cape Whanbrow, *T. Kirk! Petrie!* near Green Island, *Petrie!* vicinity of Dunedin, *Buchanan!* Black Head, *A. Wall!* Fortrose, *Petrie!* Stewart Island: Open turfy ground near the sea, not uncommon, *Thomson! Petrie! T. Kirk! Cockayne!* Var. *membranifolia:* Mount Arthur Plateau, *T. F. C.;* Cobb Valley, *F. G. Gibbs!* Brunner Range and Mount Murchison, *W. Townson!* Var. *polita:* Arthur's Pass, *T. Kirk! Cockayne!* Sea-level to 4000 ft. December–January.

A most variable plant, only separable from *B. odorata* by the larger size, coarser habit, and larger heads. It has the same strong fragrance.

4. **PACHYSTEGIA** Cheesem.

A robust spreading shrub 2–9 ft. high; branchlets stout, densely tomentose. Leaves large, rigid, coriaceous; under-surface thickly covered with densely intricate woolly hairs. Peduncles long, thick, tomentose, monocephalous. Heads large, heterogamous, radiate; involucre subglobose, narrowed upwards; bracts very numerous, in many series, densely imbricated, lanceolate, acute or the outer obtuse, uppermost with needle-like recurved points. Receptacle broad, slightly convex, foveolate. Florets of the ray numerous, in 2–3 series; ligules 3-toothed, white. Florets of the disc narrow-tubular, 5-toothed, yellow. Achenes slender, grooved, linear, densely silky. Pappus-hairs in a single series, equal in length, scabrid, slightly thickened at the apex.

A monotypic genus confined to New Zealand. It is closely allied to the Australian and New Zealand *Olearia*, in which it was originally placed by Hooker under the name of *Olearia insignis*. But Hooker himself (Handb. N.Z. Fl. (1864) 125) says that it is "almost generically distinct from *Eurybia (Olearia)* in the simple pappus of equal hairs, thickened at the tip." Later on, when figuring the species in the *Botanical Magazine* (t. 7034), he remarks, after drawing attention to the affinity of *Olearia* to the northern genus *Aster*, "Of all the many species of *Olearia*, however, none departs so widely from *Aster* as does the one here figured, which in its great ovoid involucre with the bracts in very many series, and its uniseriate pappus of perfectly equal hairs, rather clubbed at the tip, departs a good deal from the typical Olearias." Much study of the genus, both in its wild and cultivated state, has fully convinced me that the two characters mentioned above—the great ovoid involucre, with its multitudinous bracts, and the uniseriate pappus, with its clubbed equal hairs—are together quite sufficient to justify the creation of a new genus.

1. **P. insignis** *Cheesem.*—A low robust spreading shrub 1–6 ft. high, rarely more; branches stout, densely tomentose. Leaves crowded at the ends of the branches, 3–7 in. long, 1–4 in. broad, oblong or oblong-ovate or narrow-obovate, obtuse, equal or unequal at the base, quite entire, excessively thick and coriaceous, glabrous and shining above, under-surface thickly clothed with white appressed tomentum, becoming fulvous or red when dry, veins evident on both surfaces; petiole ½–2 in. long, stout. Peduncles 1–5 at the ends of the branches, 4–12 in. long, stout, evenly tomentose, naked or with a few foliaceous bracts immediately below the head. Head large, hemispherical, 2–3 in. diam.; involucral scales imbricated in many series, tomentose. Ray-florets very numerous; ligules narrow, white. Disc-florets yellow. Pappus of one series of equal scabrid hairs thickened at the tips. Achenes long and slender, silky.—Olearia

insignis *Hook. f. Fl. Nov. Zel.* ii (1855) 331; *Handb. N.Z. Fl.* (1864) 125; *Bot. Mag.* (1889) t. 7034; *T. Kirk Students' Fl.* (1899) 266; *Cheesem. Man. N.Z. Fl.* (1906) 279; *Ill. N.Z. Fl.* i (1914) t. 85. O. marginata *Col. in Trans. N.Z. Inst.* xv (1883) 321.

Var. **minor** *Cheesem. in Trans. N.Z. Inst.* xlviii (1916) 211.—Much smaller and more slender than the type; leaves smaller and narrower, 2½–4 in. long, 1¼ in. diam. Peduncles slender, 4 in. long. Heads ¾–1¼ in. long.

South Island: Marlborough—Not uncommon from a little to the south of Blenheim to Kaikoura and the Conway and Mason Rivers, usually on rocky cliffs and ledges. Var. *minor:* Near Kaikoura, *H. J. Matthews!* Sea-level to 4000 ft. December–February.

A very handsome and remarkable plant, quite unlike any other. Although New Zealand contains many beautiful shrubby composites, it may be doubted whether any one of them is more deserving of notice than the plant described above. Its peculiar habit, the excessively thick and coriaceous leaves with their shining upper surface and dense coating of white tomentum beneath, the tall stout peduncles, each with its single bold head, and the large broad involucres with their many rows of bracts are prominent and noteworthy characters; while the general appearance of the plant is singularly attractive.

5. **OLEARIA** Moench. 1802

Shrubs or trees. Leaves alternate, rarely opposite or fascicled, usually with white or buff tomentum beneath. Heads large or small, solitary or corymbose or paniculate, radiate or rarely discoid. Involucre broad or narrow; bracts imbricated in several rows, margins dry or scarious. Receptacle flat or convex, pitted. Florets few or many, rarely solitary; ray-florets female, in a single row, usually ligulate, spreading, rarely slender and filiform or altogether wanting; disc-florets hermaphrodite, tubular, 5-lobed. Anthers often acute at the base or with minute tails, rarely obtuse. Style-branches flattened, with short obtuse or rarely lanceolate appendages. Pappus of one or more rows of unequal scabrid bristles, often thickened at the tips. Achenes ribbed or striate, terete or slightly compressed.

In addition to the 42 species found in New Zealand, all of which are endemic, there are over 80 others confined to Australia and Tasmania with the exception of 2 recorded from Lord Howe Island, and 1 or 2 from New Guinea. The genus is very closely allied to *Aster*, with which the late Baron Mueller proposed to unite it, together with *Celmisia* and several other genera.

A. Heads large, 1–3 in. diam., solitary or racemed.

* Heads radiate, solitary on bracteate peduncles (racemed in *O. Traillii*).

Leaves 1½–2½ in., linear or linear-lanceolate. Peduncle slender. Rays purple	1. *O. semidentata.*
Leaves 1–3 in., elliptic-lanceolate to oblong-obovate. Peduncles slender. Rays purple or white	2. *O. chathamica.*
Leaves 2–4 in., obovate-lanceolate. Peduncles stout; bracts numerous, short, close-set. Rays white, disc-florets yellow	3. *O. operina.*
Leaves 3–5 in., narrow-lanceolate. Peduncles stout; bracts lax, long, foliaceous. Rays white; disc-florets purple	4. *O. angustifolia.*
Leaves 3–6 in., lanceolate or obovate-lanceolate. Heads racemed. Rays white; disc-florets purple	5. *O. Traillii.*

** Heads discoid, racemed.

Leaves 2–6 in., obovate or obovate-oblong, acutely serrate	6. *O. Colensoi.*
Leaves 4–8 in., orbicular-ovate, doubly crenate	7. *O. Lyallii.*

Shawia Forst. et Forst f. 1776

See Kew Bull. 1940: 128.

B. Heads small, $\frac{1}{6}$–$\frac{1}{2}$ in. diam., panicled or corymbose (solitary in O. nummularifolia*). Florets 6–24.*

* Leaves opposite.

Leaves $1\frac{1}{2}$–$2\frac{1}{2}$ in., oblong. Panicles axillary. Heads discoid .. .. 8. *O. Traversii.*
Leaves 2–4 in., elliptic-lanceolate. Heads radiate .. 9. *O. Buchanani.*

** Leaves alternate, large, $1\frac{1}{2}$–4 in. long (less in *O. suavis*), ovate to oblong, more rarely linear-oblong or oblong-lanceolate, entire or toothed or waved.

Leaves 2–4 in., ovate-oblong, obtuse, coriaceous, shining beneath. Florets 6–12 .. .. 10. *O. furfuracea.*
Dwarf shrub. Leaves 1–2 in., oblong-ovate, excessively coriaceous, silvery beneath. Heads $\frac{1}{2}$ in. diam. Florets 15–20 .. .. 11. *O. Allomii.*
Leaves 2–4 in., narrow elliptic-oblong, parallel-sided, obtuse at both ends. Heads broadly turbinate. Florets 10–15 .. .. 12. *O. Townsoni.*
Leaves 3–6 in., very coriaceous, silvery below. Flower-heads long and narrow, often over $\frac{3}{4}$ in. long; scales 35–45, imbricated in 6–8 series .. .. .. 13. *O. pachyphylla.*
Leaves 3–6 in. or more, oblong-obovate, thinly coriaceous; silvery and very finely reticulated beneath .. .. 14. *O. Thomsoni.*
Leaves $1\frac{1}{2}$–3 in., broadly ovate, acute, rather thin, satiny beneath. Florets 15–20 .. .. 15. *O. arborescens.*
Leaves 2–4 in., broadly ovate, coriaceous, sharply and coarsely toothed .. .. 16. *O. macrodonta.*
Leaves 2–4 in., linear-oblong or lanceolate, coriaceous, spinous-toothed .. .. 17. *O. ilicifolia.*
Close to *O. ilicifolia*, but young branchlets, inflorescence, and leaves beneath laxly clothed with white tomentum 18. *O. mollis.*
Leaves 2–6 in., broadly ovate, rather thin, toothed, white with soft tomentum beneath .. .. .. 19. *O. Cunninghamii.*
Leaves $1\frac{1}{2}$–$3\frac{1}{2}$ in., oblong-lanceolate, acute, obscurely sinuate-dentate .. .. 20. *O. excorticata.*
Leaves $\frac{3}{4}$–$1\frac{1}{2}$ in., linear-oblong or oblong, obtuse, entire or obscurely sinuate .. .. 21. *O. suavis.*

*** Leaves alternate, 3–7 in. long, linear or narrow-linear; lateral veins conspicuous beneath, at right angles to the midrib.

Leaves 3–7 in., $\frac{1}{2}$–1 in. broad, linear or narrow-linear, ferruginous beneath .. .. 22. *O. lacunosa.*
Much smaller. Leaves 2–5 in. long, $\frac{1}{10}$–$\frac{1}{6}$ in. broad; margins strongly revolute. Panicles small, few-flowered 23. *O. Crosby-Smithiana.*

**** Leaves alternate, small, $\frac{1}{4}$–$1\frac{1}{4}$ in. long (longer in *O. oleifolia*), coriaceous, quite entire.

Leaves $\frac{1}{3}$–$\frac{2}{3}$ in., obovate-oblong, clothed with soft white tomentum beneath. Florets 12–20 .. .. .. 24. *O. moschata.*
Leaves $\frac{1}{2}$–$1\frac{1}{4}$ in., oblong or oblong-ovate. Florets 8–10 .. 25. *O. Haastii.*
Leaves 1–3 in., lanceolate or oblong-lanceolate. Florets 4–8 26. *O. oleifolia.*
Leaves $1\frac{1}{2}$–2 in., elliptic-lanceolate. Corymbs small, lateral; heads few .. .. 27. *O. Willcoxii.*
Leaves $\frac{1}{5}$–$\frac{1}{2}$ in., orbicular to oblong. Heads solitary. Florets 6–12 .. .. 28. *O. nummularifolia.*
Leaves oblong, $\frac{1}{4}$–$\frac{1}{2}$ in., margins revolute all round, hence boat-shaped with the cavity beneath. Heads solitary .. 29. *O. cymbifolia.*

C. Heads small, $\frac{1}{6}$–$\frac{1}{5}$ in. long, narrow, cylindrical, panicled. Florets few, 1–5, rarely more. Leaves large, $1\frac{1}{2}$–4 in., alternate.

Leaves 2–4 in., oblong or ovate-oblong, white beneath, often undulate. Florets 3–6 .. .. .. 30. *O. albida.*
Leaves $1\frac{1}{2}$–$2\frac{1}{2}$ in., elliptic, obtuse, undulate. Florets 3–5 .. 31. *O. angulata.*
Leaves 2–4 in., elliptic-lanceolate, acute, flat. Florets 2–3 32. *O. avicenniaefolia.*
Leaves $1\frac{1}{2}$–3 in., oblong or oblong-ovate, obtuse, undulate. Florets never more than one .. .. .. 33. *O. paniculata.*

O. serpentina Chr. Hallr. 1926: 220. nom. nud.
" Lindp. 75: 200.

Leaves ½–¾ in., ovate or orbicular-ovate, very thick and coriaceous; margins much recurved. Florets never more than one .. .. 34. *O. coriacea.*

D. Heads small, ⅛ in. long, crowded in axillary sessile glomerules. Leaves small, alternate or in alternate fascicles.

Leaves ¾–1½ in., elliptic-oblong or -lanceolate .. .. 35. *O. fragrantissima.*

E. Heads small, ⅙–¼ in. long, solitary or fascicled. Leaves opposite or in opposite fascicles, small, ⅕–1¼ in. long.

Leaves ¾–1½ in., obovate to linear-obovate, thin, membranous. Heads fascicled on slender pedicels. Florets 20–25 36. *O. Hectori.*

Leaves ⅓–1 in., linear-spathulate, coriaceous. Heads fascicled; pedicels short. Involucre viscid and glandular. Florets 20–35 .. .. 37. *O. odorata.*

Leaves ½–1 in., linear-spathulate, coriaceous. Heads fascicled; pedicels slender. Involucre tomentose, not viscid. Florets 6–8 .. .. 38. *O. laxiflora.*

Leaves ¼–½ in., linear-obovate, white beneath. Heads solitary or fascicled, shortly pedicelled or sessile. Florets 5–12 .. .. 39. *O. virgata.*

Branches stiff, divaricating; tomentum rusty. Florets few .. .. 40. *O. divaricata.*

Branches slender, often pendulous. Leaves fascicled, excessively narrow-linear, ½–2 in. long; margins much revolute. Florets numerous .. .. .. 41. *O. lineata.*

Leaves ⅕–⅓ in., linear or linear-obovate, yellowish beneath. Heads solitary, terminating short lateral branchlets. Florets 8–20 .. .. 42. *O. Solandri.*

Olearia rigida Col. in Trans. N.Z. Inst. xx (1888) 194, T. Kirk Students' Fl. (1899) 271, is proved by the type specimen in Mr. Colenso's herbarium to be *Senecio Bidwillii* Hook. f. In a similar manner *O. xanthophylla* Col. *l.c.* 193 is shown to be *Cassinia Vauvilliersii* Hook. f.

1. **O. semidentata** *Decne. ex Hook. f. Fl. Nov. Zel.* i (1853) 115.—A small sparingly branched shrub 1–3 ft. high; branches slender, straggling, more or less clothed with white floccose tomentum. Leaves numerous, close-set, ascending or spreading, 1½–2½ in. long, ¼–⅓ in. broad, lanceolate or linear-lanceolate, acute, gradually narrowed to a sessile base, somewhat distantly serrate towards the tip, glabrous above or slightly cottony when young, white with appressed floccose tomentum beneath. Peduncles crowded towards the tips of the branches, slender, tomentose, equalling or exceeding the leaves, clothed with numerous small lanceolate bracts. Heads solitary, 1–1¼ in. diam.; involucral scales in about 3 series, acute, cobwebby at the tips. Ray-florets ligulate, purple; disc-florets violet-purple. Achenes linear, grooved, slightly pubescent.—*Hook. f. Handb. N.Z. Fl.* (1864) 124; *Buch. in Trans. N.Z. Inst.* vii (1875) 336, t. xiv; *T. Kirk Students' Fl.* (1899) 264; *Cheesem. Man. N.Z. Fl.* (1906) 280; *Ill. N.Z. Fl.* i (1914) t. 86; *Bot. Mag.* (1914) t. 8550; *Dorrien-Smith in Kew Bulletin* (1910) 120–26. Eurybia semidentata *F. Muell. Veg. Chath. Is.* (1864) 21.

Var. **albiflora** *Dorrien-Smith l.c., with plate.*—Similar to the type, but flowers white.

CHATHAM ISLANDS: Abundant in peat-bogs. *Hangatare.* November–December.

A beautiful little plant, easily separated from all its allies by its small size, narrow leaves, slender peduncles, and usually purple flowers. An interesting account of an attempt made by Captain Dorrien-Smith to introduce it into the British Isles is given in the Kew Bulletin for 1910 (pp. 120–26), and should be consulted for information respecting the habitat and life-history of the plant.

2. **O. chathamica** *T. Kirk in Trans. N.Z. Inst.* xxiii (1891) 444.—A rather stout branching shrub 3–6 ft. high; branches, leaves beneath, and peduncles densely clothed with soft white tomentum. Leaves 1–3 in. long, ½–1½ in. broad, very variable in shape, lanceolate or elliptic-lanceolate to oblong-ovate or oblong-obovate, acute, narrowed into a short broad petiole, very thick and coriaceous, closely serrate with short blunt callous teeth; midrib and chief veins usually visible beneath. Peduncles few at the tips of the branches, usually exceeding the leaves; bracts few, linear or lanceolate. Heads solitary, large, 1½–1¾ in. diam.; involucral scales more or less concealed with white cobwebby tomentum. Ray-florets ligulate, white or purplish; disc-florets violet-purple. Achenes linear, curved, slightly pubescent.—*Students' Fl.* (1899) 264; *Cheesem. Man. N.Z. Fl.* (1906) 280; *Ill. N.Z. Fl.* i (1914) t. 87; *Bot. Mag.* (1912) t. 8420. O. operina *Hook.f. Handb. N.Z. Fl.* (1867) 731 (*in part*). O. angustifolia *var. Hook. f. ex Buch. in Trans. N.Z. Inst.* vii (1875) 336, t. 15.

Chatham Islands: In swampy places in the higher parts of the island and on cliffs, *H. H. Travers! J. D. Enys! F. A. D. Cox! Cockayne! Keketerehe.* November–February.

Closely allied to both *O. operina* and *O. angustifolia*, but differing in the broader leaves, much more slender peduncles, and fewer bracts. It is separated from *O. semidentata* by its more robust habit, broader and more coriaceous leaves, and larger flower-heads, the ray-florets of which are usually white.

3. **O. operina** *Hook. f. Fl. Nov. Zel.* i (1853) 114.—A stout sparingly branched shrub 6–12 ft. high; branches, leaves beneath, peduncles, and inflorescence densely clothed with soft white tomentum. Leaves often crowded at the tips of the branches, spreading, 2–4 in. long, ½–¾ in. broad, narrow obovate-lanceolate, acuminate, gradually narrowed into a short winged petiole, rigid, very thick and coriaceous, glabrous above; margins with numerous close blunt teeth with callous tips. Peduncles crowded at the ends of the branches, 1–3 in. long, stout, densely clothed with numerous closely imbricating lanceolate or linear obtuse bracts. Heads large, 1–1½ in. diam.; involucral scales in 2–3 series, tomentose. Ray-florets white; disc-florets yellow. Achenes ¼ in. long, linear, conspicuously ribbed, silky. — *Handb. N.Z. Fl.* (1864) 124; *T. Kirk Students' Fl.* (1899) 264; *Cheesem. Man. N.Z. Fl.* (1906) 281. Arnica oporina *Forst. f. Prodr.* (1786) 56.

Var. **robusta** *T. Kirk Students' Fl.* (1899) 265.—Branches short, stout. Leaves shorter and broader, with more deeply toothed margins. Peduncles shorter and stouter.

South Island: Sounds of the south-west coast, from Martin's Bay to Preservation Inlet, abundant. December–January.

4. **O. angustifolia** *Hook. f. Fl. Nov. Zel.* i (1853) 115.—A stout branching shrub or small tree 6–20 ft. high; branches, leaves beneath, and peduncles clothed with soft white tomentum. Leaves 3–5 in. long, ½–¾ in. broad, narrow-lanceolate, acuminate, narrowed to the base, sessile, extremely rigid and coriaceous, glabrous and glossy above, irregularly finely crenate-dentate, teeth with hard callous points; midrib and principal nerves evident below. Peduncles crowded at the ends of the branches, stout, shorter than the leaves, clothed with laxly imbricating foliaceous bracts, white beneath. Heads large, 1½–2 in. diam.; involucral scales in 2 series, the outer densely tomentose. Ray-florets white; disc-florets purple.

Achenes linear, grooved, silky.—*Handb. N.Z. Fl.* (1864) 124; *T. Kirk Forest Fl.* (1889) t. 138; *Students' Fl.* (1899) 265; *Cheesem. Man. N.Z. Fl.* (1906) 281.

South Island: Puysegur Point, *T. Kirk;* near the Bluff Hill, *B. C. Aston;* islands in Foveaux Strait, *Poppelwell.* Stewart Island: Common on headlands to the south of Paterson Inlet, and on the adjacent islands, *Lyall, T. Kirk! Petrie! Thomson! Cockayne! Tete-a-weka.* November–January.

A very handsome plant, distinguished from *O. operina* by the larger size, narrower and longer leaves with the veins evident beneath, large foliaceous bracts, and larger heads with deep-purple disc-florets. The flowers are highly fragrant.

5. **O. Traillii** *T. Kirk in Trans. N.Z. Inst.* xvi (1884) 372.—A shrub or small tree 10–15 ft. high or more; branches stout, densely clothed with soft white tomentum. Leaves crowded at the tips of the branches, spreading, 3–6 in. long, 1–1½ in. broad, lanceolate or narrow obovate-lanceolate, acuminate, gradually narrowed into a short broad petiole, very thick and coriaceous, glabrous above or slightly cottony when young, clothed with white tomentum beneath; margins irregularly doubly crenate-dentate. Racemes terminal, erect, 4–10 in. long, 3–8-headed; bracts large, leafy, 1–2 in. long; rhachis, peduncles, and under-surface of bracts white with appressed tomentum. Heads 1 in. diam; involucral scales in 2–3 series, linear, scarious, villous at the tips. Ray-florets shortly ligulate, white; disc-florets violet-purple. Achenes linear, grooved, silky.—*Forest Fl.* (1889) t. 142; *Students' Fl.* (1899) 265; *Cheesem. Man. N.Z. Fl.* (1906) 282.

Stewart Island: Coastal localities to the south of Paterson Inlet, not common, *T. Kirk! Cockayne! H. Guthrie-Smith!* Breaksea Island, *Poppelwell.* November–January.

A very fine plant, closely allied to *O. Colensoi,* but easily separated by the narrower leaves and rayed flower-heads.

6. **O. Colensoi** *Hook. f. Fl. Nov. Zel.* i (1853) 115, t. 29.—A stout closely branched shrub 4–10 ft. high, more rarely forming a small tree 15–30 ft. or more, with a trunk 12–24 in. diam. Leaves spreading, variable in size and shape, 2–6 in. long, obovate or obovate-oblong to oblong-lanceolate or obovate-lanceolate, acute or rarely obtuse, narrowed into a short stout petiole, excessively thick and coriaceous, acutely irregularly serrate or doubly serrate, glabrous and shining above when mature, cottony when young, under-surface clothed with dense white appressed tomentum. Racemes several at the tips of the branches, tomentose, 3–8 in. long, bearing 4–10 pedicelled heads; bracts loosely placed. Heads ⅔–1 in. diam.; discoid, dark brownish-purple; involucral scales in 1–2 series, linear, glabrous or villous at the tips. Florets all tubular; female in a single row, corolla usually 3-lobed; hermaphrodite broader, campanulate above. Achenes grooved, silky.—*Handb. N.Z. Fl.* (1864) 124; *T. Kirk Forest Fl.* (1889) t. 102; *Students' Fl.* (1899) 265; *Cheesem. Man. N.Z. Fl.* (1906) 282.

North Island: Mount Hikurangi, mountains above Waikaremoana, Ruahine Mountains, Tararua Mountains, Rimutaka Range, alt. 3000–5000 ft. South Island: Common on the mountains on the western side of the Island, descending to sea-level on the sounds of the south-west coast. Stewart Island: Extremely abundant, descending to sea-level, also on the adjacent islands. The Solanders: *Captain Bollons. Taipari.* December–January.

A very handsome plant. On the mountains it usually forms a densely branched shrub, but at low levels on Stewart Island it attains the dimensions of a small tree, often having leaves almost as large as those of the following species.

7. **O. Lyallii** *Hook. f. Fl. Nov. Zel.* i (1853) 116.—A robust shrub or small tree, sometimes reaching the height of 30 ft., with a trunk 18–24 in. diam.; branches stout, spreading, densely tomentose. Leaves 4–8 in. long (or more in young plants), elliptic-ovate or orbicular-ovate, abruptly acuminate, shortly petiolate, excessively rigid and coriaceous, white with floccose tomentum above but becoming glabrous when old, under-surface densely clothed with soft white wool; margins irregularly doubly crenate. Racemes terminal, stout, 4–8 in. long; rhachis, pedicels, and bracts clothed with snow-white wool. Heads large, discoid, $1\frac{1}{4}$–$1\frac{1}{2}$ in. diam., dark-brown; involucral scales numerous, in 4–8 series, linear, villous at the tips. Achenes densely silky.—*Handb. N.Z. Fl.* (1864) 125; *T. Kirk Students' Fl.* (1899) 266; *Cheesem. Man. N.Z. Fl.* (1906) 283; *Subantarct. Is. N.Z.* ii (1909) 413.

The Snares: Abundant, *T. Kirk! Cockayne! B. C. Aston!* and others. Auckland Islands: Rare and local, but forming a dense forest on Ewing Island, at the entrance to Port Ross, *Lyall, Bolton, T. Kirk! Cockayne! B. C. Aston! J. S. Tennant!*

A magnificent plant, nearly related to *O. Colensoi*, but at once distinguished by the open and far more robust habit, larger and broader leaves, which are tomentose on the upper surface as well as beneath, and by the scales of the involucre being in several series.

(T.v. Tuah)

8. **O. Traversii** *Hook. f. Handb. N.Z. Fl.* (1867) 731.—A small tree 15–30 ft. high, with a trunk 1–2 ft. diam.; bark pale, furrowed; branches tetragonous, clothed with appressed silky tomentum, as are the leaves beneath, branches of the inflorescence, and involucres. Leaves opposite, $1\frac{1}{2}$–$2\frac{1}{2}$ in. long, oblong or ovate-oblong to broadly ovate, acute or apiculate, shortly petiolate, quite entire, flat, glabrous above or slightly silky when young. Panicles numerous, axillary, much branched, shorter or longer than the leaves. Heads numerous, small, $\frac{1}{4}$ in. long, discoid; scales of the involucre few, linear-oblong, obtuse or subacute. Florets 5–15; outer ones female, with a minute tubular corolla with an oblique mouth; central hermaphrodite, campanulate above; style-branches very short. Pappus 1-seriate. Achenes striate, silky.—*T. Kirk Forest Fl.* (1889) t. 34; *Students' Fl.* (1899) 267; *Cheesem. Man. N.Z. Fl.* (1906) 284. Eurybia Traversii *F. Muell. Veg. Chath. Is.* (1864) 19, t. 2.

Chatham Islands: Abundant in woods. *Akeake.* October–November.

A well-marked plant, easily recognized by the opposite leaves, axillary panicles, and discoid heads.

9. **O. Buchanani** *T. Kirk Students' Fl.* (1899) 267.—An erect shrub or small tree; branchlets as thick as a goose-quill, reddish, glabrous. Leaves opposite, 2–4 in. long, elliptic-lanceolate, obtuse, gradually narrowed into a short petiole, quite entire, flat, glabrous above, clothed with thin appressed whitish tomentum beneath; veins finely reticulated above, obscure beneath. Heads small, $\frac{1}{4}$ in. long, in rather loose branched axillary corymbs about equalling the leaves; pedicels slender, pubescent. Involucral scales 8–10, pubescent at the tips. Florets of the ray 3–4, ligulate; of the disc about 4, campanulate above. Achenes short, grooved, pubescent.—*Cheesem. Man. N.Z. Fl.* (1906) 283.

North Island: *Buchanan!* The exact locality not known.

Founded on a single specimen in Mr. Kirk's herbarium stated to have been collected by Mr. Buchanan in the year 1870 in some locality in the North Island. It is evidently a distinct species, not closely related to any other. It and *O. Traversii* are the only species found in New Zealand with large opposite leaves. As no additional information has been obtained since the publication of the first edition of this work, I reproduce the matter given therein.

10. **O. furfuracea** *Hook. f. Handb. N.Z. Fl.* (1864) 125.—A much-branched shrub or small tree 8–20 ft. high; branches stout, spreading; younger ones terete or grooved, velvety-pubescent. Leaves alternate, 2–4 in. long, 1½–2½ in. broad, variable in shape, oblong or elliptic-oblong to ovate-oblong or broad-ovate, obtuse or rarely acute, rounded and often unequal at the base, coriaceous, glabrous above, beneath clothed with densely appressed smooth and silvery tomentum; margins flat or undulate, entire or remotely sinuate-toothed; veins reticulated on both surfaces or obscure beneath; petiole stout, ½–1 in. long. Corymbs large, much-branched, on long slender peduncles. Heads very numerous, ⅓ in. long, narrow-turbinate; scales of the involucre in several series, imbricate, oblong, villous or fimbriate. Florets 5–12; ray-florets 2–5, with a short broad ray; disc-florets 3–7. Pappus-hairs often thickened and fimbriate at the tips, outer hairs short. Achenes small, faintly striate, pubescent.—*T. Kirk Students' Fl.* (1899) 267; *Cheesem. Man. N.Z. Fl.* (1906) 284. Eurybia furfuracea *DC. Prodr.* v (1836) 267; *Hook. f. Fl. Nov. Zel.* i (1853) 117. Haxtonia furfuracea *A. Cunn. Precur.* (1838) n. 440. Shawia furfuracea *Raoul Choix* (1846) 45. Aster furfuraceus *A. Rich. Fl. Nouv. Zel.* (1832) 246.

North Island: Abundant from the North Cape to Hawke's Bay and Taranaki; Ruahine and Kaimanawa Mountains. *Wharangipiro; Akepiro.* Sea-level to 2000 ft. November–January.

A very common plant to the north of the East Cape, varying greatly in the size, shape, and texture of the leaves, the size of the flower-heads, and the number of florets. Two forms may perhaps be distinguished, one with broad heads containing 8–12 florets, the other with much narrower heads and 4 to 8 florets. To this state Mr. Kirk gives the varietal name of *angustata.*

11. **O. Allomii** *T. Kirk in Trans. N.Z. Inst.* iii (1871) 179.—A dwarf sparingly branched shrub 1–3 ft. high; branches stout, and with the inflorescence and leaves beneath clothed with smooth and shining silvery tomentum. Leaves alternate, rather close-set, 1–2 in. long, ¾–1½ in. wide, oblong-ovate or elliptic-ovate, obtuse, truncate or rounded and often unequal at the base, shortly petiolate, excessively thick and coriaceous; veins reticulated above, midrib prominent below. Corymbs longer than the leaves, branched. Heads large, ½ in. diam., or even more when fully expanded; involucre broadly turbinate; scales laxly imbricate, tomentose, obtuse. Florets 15–20; rays about 8. Pappus-hairs unequal. Achenes grooved, hispid.—*Students' Fl.* (1899) 271; *Cheesem. Man. N.Z. Fl.* (1906) 284.

North Island: Great Barrier Island, not uncommon from sea-level to 2500 ft., *T. Kirk!* cliffs at Whangaparapara, *Colonel Boscawen!* near Tryphena Harbour, *A. J. Osborne!* November–December.

Differs from *O. furfuracea* in the much smaller size, smaller close-set excessively rigid and coriaceous leaves, and especially in the much larger heads with twice the number of florets. I have a plant from Castle Hill, Coromandel, which resembles it in foliage, but forms a large shrub 12 ft. high. A similar form has been gathered by Petrie at Mercury Bay. But both of these have few-flowered heads only slightly larger than those of the typical state of *O. furfuracea*, and are best placed under that species.

12. **O. Townsoni** *Cheesem. n. sp.*—A much-branched shrub or small tree 8–15 ft. high; branches stout, spreading; the younger ones grooved and angled, densely covered with close yellowish-brown tomentum. Leaves

alternate, 2–4 in. long including the petiole, ¾–1¼ in. broad, narrow elliptic-oblong, obtuse at both ends, but often unequally so at the base, thick and coriaceous, glabrous and finely reticulated above, beneath densely covered with smooth yellowish-white tomentum; veins indistinct; margins slightly recurved, even or very slightly undulate. Corymbs large, much branched, 2–4 in. diam., on long slender peduncles. Heads very numerous, ⅓ in. long, broadly turbinate; scales of the involucre in 3–4 series, the lowermost ovate, the upper elliptic-oblong, laxly tomentose. Florets 10–15. Achenes deeply grooved, clothed with spreading hairs. Pappus-hairs equal.

North Island: Upper Kauaeranga Valley, Thames, *W. Townson!* December–January.

Although closely allied to *O. furfuracea*, this can be at once distinguished by the parallel-sided narrow elliptic-oblong leaves, which are equally rounded at both ends. The heads are also broader, and have more numerous florets than *O. furfuracea*.

13. **O. pachyphylla** *Cheesem. in Trans. N.Z. Inst.* xlii (1910) 216.—A much and closely branched shrub 4–8 ft. high; branches very stout, grooved and angled, the younger ones clothed with appressed brownish tomentum. Leaves alternate; blade 3–5 in. long by 2–2½ in. broad, ovate or oblong-ovate, obtuse or subacute, rounded and more or less unequal at the base, excessively thick and coriaceous, glabrous above, beneath clothed with densely appressed silvery-white or silvery-brown tomentum; margins entire but more or less undulate; veins finely reticulated beneath, less evident above; petiole stout, grooved, 1–1½ in. long. Corymbs much branched, 3–5 in. diameter; peduncles 4–6 in. long. Heads very numerous, ½–¾ in. long, narrow at the base but gradually widening upwards; scales of the involucre in very many series, densely imbricated, the lowest minute, the upper gradually larger, the whole more or less clothed with yellowish-brown woolly tomentum. Florets 7–10; ray-florets 3–5, disc-florets 4–6. Pappus-hairs unequal in size, rigid, thickened and fimbriate at the tips. Achenes striate, silky-pubescent.

North Island: Bay of Plenty, hills and sea-cliffs at Opape, on the road from Opotiki to Torere and Te Kaha, *Bishop Williams! N. Potts!* March–April.

A very remarkable plant. In habit and foliage it much resembles *O. furfuracea*, and when out of flower might easily be taken for a robust large-leaved form of that species. But the flower-heads are altogether unlike those of *O. furfuracea*, or of any other species, being remarkable for their great length (quite ¾ in.) and the number of the involucral scales (35–45), which are imbricated in 6–8 series, thus giving the involucre an altogether different appearance from that of *O. furfuracea*. In that species the heads do not exceed ⅓ in., and the scales number 12–15.

14. **O. Thomsoni** *Cheesem. n. sp.*—A tall branching tree 8–15 ft. high; branches stout, spreading, terete, glabrous or nearly so; younger ones grooved and angled, faintly tomentose at the tips. Leaves alternate, rather large, 3–6 in. long including the petiole, 1½–2 in. broad, oblong-obovate to elliptic-ovate, obtuse or subacute, gradually tapering at the base into a moderately long petiole, coriaceous but not conspicuously so, entire or very obscurely sinuate, glabrous and very finely reticulate, beneath clothed with thin and very finely appressed silvery-white tomentum, veins finely reticulate, midrib evident. Corymbs large, much branched, open; peduncles long, glabrous; pedicels very slender, ½–½ in. long. Heads very numerous, ⅓ in. long, narrow-turbinate; scales of the involucre in

4–5 series, imbricate, villous or thinly tomentose, lower ovate, acute, upper ovate-lanceolate. Florets of the ray 4–7; of the disc 8–10. Ripe achenes not seen.

North Island: Wanganui River, Ohura basin, *B. C. Aston! W. A. Thomson!* (cultivated specimens).

This is evidently a distinct species, although clearly allied to the *O. furfuracea* group. But it is readily separated by the large oblong-obovate leaves, which are remarkable for their thinly coriaceous texture, finely reticulated veins, and the delicate thin and silvery tomentum of the under-surface. The species is named in honour of Mr. W. A. Thomson, of Dunedin, who has kindly supplied me with flowering specimens cultivated in his garden at Half-way Bush, Dunedin.

15. **O. arborescens** *Cockayne and R. M. Laing in Trans. N.Z. Inst.* xliii (1911) 367.—A much-branched shrub 3–12 ft. high, rarely more;

hybrid. new species. new species

Olearia cheesemanii Ckn. & Allan.

= (O. arborescens var. augustifolia cheesem).

Ohinemuri Gorge, Lake Waikaremoana,

Otaki Gorge - and near Westport.

(see T.N.Z.I. vol. 57, p. 57. Ckn. & Allan)

orbiculata *Col. l.c.* xviii (1886) 263. O. erythropappa *Col. l.c.* xxii (1890) 468. O. multiflora *Col. l.c.* xxvii (1895) 387. See also Duncan 1916 - 637

Var. **cordatifolia** *T. Kirk Students' Fl.* (1899) 268.—Leaves orbicular, cordate at the base, very coriaceous. Heads broadly obconic; involucral scales densely woolly, inner villous at the tips. Florets about 20; those of the ray with long and narrow ligules.

Var. **angustifolia** *Cheesem. Man. N.Z. Fl.* (1906) 285.—Leaves 2–3½ in. long, linear-lanceolate to lanceolate or oblong-lanceolate, almost membranous, margins sinuate. Corymbs lax, much branched. Heads large, ⅓ in. long; rays long and narrow.

Var. **capillaris** *T. Kirk l.c.*—Small, stout or slender, densely or sparingly branched, Leaves small, ¼–1 in. long, ovate or rounded, membranous or subcoriaceous, silky above when young. Heads 3–12, in sparingly branched corymbs longer than the leaves; pedicels very slender; involucral scales glabrate or slightly villous. Florets 8–12.—O. capillaris *Buch. in Trans. N.Z. Inst.* iii (1871) 212. See Trans. 72: 33.

North and South Islands, Stewart Island: Not uncommon from the East Cape, Taupo, and Mount Egmont southwards. Sea-level to 4000 ft. November–January. Var. *cordatifolia:* Stewart Island, *T. Kirk! Cockayne!* Var. *angustifolia:* Ohinemuri Gorge, *T. F. C.;* Lake Waikaremoana, *Sainsbury!* Ngakawa, near Westport, *P. G. Morgan!* Var. *capillaris:* Mount Egmont, *Adams* and *T. F. C.;* Waimarino Plains and base of Ruapehu, *E. P. Turner! T. F. C., H. Carse!* Nelson Mountains, *H. H. Travers! Dall!* source of the Poulter River (Canterbury), *Cockayne!*

Perhaps the most variable species of the genus, but generally to be recognized in all its forms by the thin white and peculiarly satiny tomentum on the under-surface of the leaves.

Tongariro

O. arborescens x lacunosa Trans. 57: 1926: 71

" x ilicifolia " 59: 127.

Arthur's Pass.

alternate, 2–4 in. long including the petiole, ¾–1¼ in. broad, narrow elliptic-oblong, obtuse at both ends, but often unequally so at the base, thick and coriaceous, glabrous and finely reticulated above, beneath densely covered with smooth yellowish-white tomentum; veins indistinct; margins slightly recurved, even or very slightly undulate. Corymbs large, much branched, 2–4 in. diam., on long slender peduncles. Heads very numerous, ⅓ in. long, broadly turbinate; scales of the involucre in 3–4 series, the lowermost ovate, the upper elliptic-oblong, laxly tomentose. Florets 10–15. Achenes deeply grooved, clothed with spreading hairs. Pappus-hairs equal.

North Island: Upper Kauaeranga Valley, Thames, *W. Townson!* December–January.

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4–5 series, imbricate, villous or thinly tomentose, lower ovate, acute, upper ovate-lanceolate. Florets of the ray 4–7; of the disc 8–10. Ripe achenes not seen.

North Island: Wanganui River, Ohura basin, *B. C. Aston! W. A. Thomson!* (cultivated specimens).

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15. **O. arborescens** *Cockayne and R. M. Laing in Trans. N.Z. Inst.* xliii (1911) 367.—A much-branched shrub 3–12 ft. high, rarely more; branches stout or slender, often angular. Leaves alternate, variable in size, 1½–3½ in. long, broadly ovate or elliptic-ovate, acute or acuminate, rounded and often unequal at the base, coriaceous or almost membranous, clothed with appressed white and satiny tomentum beneath; margins distinctly or obscurely sinuate-dentate, rarely entire; petiole ½–1 in. long. Corymbs large, rounded, much branched, very effuse; branches slender, silky-pubescent. Heads numerous, ⅛–¼ in. long, obconic; scales of the involucre laxly imbricating; the outer ovate, pubescent or villous; the inner linear, fimbriate or sparingly silky. Florets 15–20; ray-florets 7–10; with a short broad ray. Pappus-hairs unequal, dirty-white or reddish. Achenes short, broad, silky.—Solidago arborescens *Forst. f. Prodr.* (1786) 56. Steiraclis arborescens *DC. Prodr.* v (1836) 345. Shawia arborescens *Raoul Choix* (1846) 45. Eurybia nitida *Hook. f. Fl. Nov. Zel.* i (1853) 117. E. alpina *Lindl. and Paxton Flow. Gard.* ii (1851–52) 84. Olearia nitida *Hook. f. Handb. N.Z. Fl.* (1864) 125; *T. Kirk Students' Fl.* (1899) 268; *Cheesem. Man. N.Z. Fl.* (1906) 285; *Ill. N.Z. Fl.* i (1914) t. 88. O. populifolia *Col. in Trans. N.Z. Inst.* xvii (1885) 243. O. suborbiculata *Col. l.c.* xviii (1886) 263. O. erythropappa *Col. l.c.* xxii (1890) 468. O. multiflora *Col. l.c.* xxvii (1895) 387.

Var. **cordatifolia** *T. Kirk Students' Fl.* (1899) 268.—Leaves orbicular, cordate at the base, very coriaceous. Heads broadly obconic; involucral scales densely woolly, inner villous at the tips. Florets about 20; those of the ray with long and narrow ligules.

Var. **angustifolia** *Cheesem. Man. N.Z. Fl.* (1906) 285.—Leaves 2–3½ in. long, linear-lanceolate to lanceolate or oblong-lanceolate, almost membranous, margins sinuate. Corymbs lax, much branched. Heads large, ⅓ in. long; rays long and narrow.

Var. **capillaris** *T. Kirk l.c.*—Small, stout or slender, densely or sparingly branched, Leaves small, ¼–1 in. long, ovate or rounded, membranous or subcoriaceous, silky above when young. Heads 3–12, in sparingly branched corymbs longer than the leaves; pedicels very slender; involucral scales glabrate or slightly villous. Florets 8–12.—O. capillaris *Buch. in Trans. N.Z. Inst.* iii (1871) 212.

North and South Islands, Stewart Island: Not uncommon from the East Cape, Taupo, and Mount Egmont southwards. Sea-level to 4000 ft. November–January. Var. *cordatifolia:* Stewart Island, *T. Kirk! Cockayne!* Var. *angustifolia:* Ohinemuri Gorge, *T. F. C.;* Lake Waikaremoana, *Sainsbury!* Ngakawa, near Westport, *P. G. Morgan!* Var. *capillaris:* Mount Egmont, *Adams* and *T. F. C.;* Waimarino Plains and base of Ruapehu, *E. P. Turner! T. F. C., H. Carse!* Nelson Mountains, *H. H. Travers! Dall!* source of the Poulter River (Canterbury), *Cockayne!*

Perhaps the most variable species of the genus, but generally to be recognized in all its forms by the thin white and peculiarly satiny tomentum on the under-surface of the leaves.

16. **O. macrodonta** *Baker in Gard. Chron.* i (1884) 604.—A shrub or small tree 5–20 ft. high, with a strong musky fragrance; branchlets clothed with closely appressed tomentum. Leaves alternate, 2–4 in. long, 1–1½ in. broad, ovate or ovate-oblong to narrow-oblong, acute or acuminate, rounded or rarely truncate at the base, rigid and coriaceous, silky above when young but becoming glabrous when mature, beneath clothed with closely appressed white tomentum; margins waved, closely and sharply toothed; veins at an obtuse angle to the midrib. Corymbs large, rounded, much branched. Heads numerous, ¼–⅓ in. long, campanulate; scales of the involucre few, pubescent or villous. Florets 8–12; ray-florets 3–5, ligules short and narrow; disc-florets 4–7. Pappus-hairs unequal, dirty-white or reddish. Achenes short, grooved, pubescent.—*Bot. Mag.* t. 7065; *T. Kirk Students' Fl.* (1899) 268; *Cheesem. Man. N.Z. Fl.* (1906) 286. O. dentata *Hook. f. Handb. N.Z. Fl.* (1864) 126 (*not of Moench.*). Eurybia dentata *var.* oblongifolia *Hook. f. Fl. Nov. Zel.* i (1853) 118.

North and South Islands: In mountain districts from the East Cape, Taupo, and Mount Egmont southwards. 1500–4000 ft. January–February.

A distinct species, at once separated from its immediate allies by the large coarsely toothed leaves.

17. **O. ilicifolia** *Hook. f. Handb. N.Z. Fl.* (1864) 126.—Size and habit of *O. macrodonta*, and with the same musky fragrance. Branchlets stout, sometimes almost glabrous. Leaves alternate, 2–4 in. long, linear or linear-oblong or lanceolate, acute or acuminate, truncate or more rarely rounded at the base, rigid and coriaceous, usually clothed with thin yellowish-white tomentum beneath; margins much and deeply waved, sharply serrate-dentate, teeth hard and spinous; veins spreading at right angles. Inflorescence and heads much as in *O. macrodonta.*—*T. Kirk Students' Fl.* (1899) 269; *Cheesem. Man. N.Z. Fl.* (1906) 286. O. multibracteolata *Col. in Trans. N.Z. Inst.* xvii (1885) 242. Eurybia dentata *var.* linearifolia *Hook. f. Fl. Nov. Zel.* i (1853) 118.

North and South Islands, Stewart Island: In mountain districts from the East Cape, Taupo, and Mount Egmont southwards, not uncommon. Sea-level to 4000 ft. December–January.

In its ordinary state this has a very different appearance to *O. macrodonta*, but intermediates are not uncommon.

18. **O. mollis** *Cockayne in Trans. N.Z. Inst.* xliii (1911) 173.—Size and habit of growth entirely that of *O. ilicifolia;* but young branchlets, inflorescence, and leaves beneath densely clothed with lax white or yellowish-white tomentum. Leaves rounded at the base, with much smaller, softer, and less spinous teeth; veins more prominent beneath. Inflorescence precisely that of *O. ilicifolia* and *O. macrodonta.*—O. ilicifolia *var.* mollis *T. Kirk Students' Fl.* (1899) 269; *Cheesem. Man. N.Z. Fl.* (1906) 286.

South Island: Mountains near Collingwood, *Dall!* Westland—Teremakau Valley, *Petrie!* Otira Gorge, *Cockayne!* Otago—Clinton Saddle, *R. M. Laing.*

In the first edition of this work I treated this as a variety of *O. ilicifolia*, and there can be no question as to the close relationship of the two plants. But there is considerable weight in Dr. Cockayne's argument that if it be right to separate *O. macrodonta* and *O. ilicifolia*, then for the sake of consistency *O. mollis* and *O. ilicifolia* should also be divorced. On the whole, it is perhaps best to keep the three plants as distinct species.

= O. rani (A. Cunn.) Druce 1916: 638

19. **O. Cunninghamii** *Hook. f. Handb. N.Z. Fl.* (1864) 126.—A shrub or small tree 8–25 ft. high; branches, inflorescence, petioles, and leaves beneath clothed with soft white or buff tomentum. Leaves alternate, 2–6 in. long, very variable in shape, broadly ovate or elliptical to oblong or linear-oblong, acute or rarely obtuse, rounded or narrowed at the base; margins irregularly coarsely toothed; petioles stout or slender, $\frac{1}{2}$–$1\frac{1}{2}$ in. long. Panicles very large, wide-spreading, much branched. Heads numerous, $\frac{1}{4}$–$\frac{1}{3}$ in. diam., campanulate; scales of the involucre in several series, lanceolate or ovate-lanceolate, obtuse or subacute, tomentose or villous or nearly glabrous. Florets 12–24; ray-florets the most numerous; ligules short, broad. Pappus-hairs white or reddish, unequal. Achenes quite glabrous or rarely with a few scattered hairs.—*T. Kirk Forest Fl.* (1889) t. 114; *Students' Fl.* (1899) 269; *Cheesem. Man. N.Z. Fl.* (1906) 286. Eurybia Cunninghamii *Hook. f. Fl. Nov. Zel.* i (1853) 117, t. 30. Brachyglottis Rani *A. Cunn. Percur.* (1838) n. 465.

Var. **colorata** *T. Kirk Students' Fl.* (1899) 269.—Leaves narrower, oblong-lanceolate to lanceolate. Otherwise as in the type.—O. colorata *Col. in Trans. N.Z. Inst.* xii (1880) 362.

North and South Islands: Abundant in woods from the North Cape to Marlborough and Nelson. Sea-level to 2500 ft. *Heketara.* October–November.

See Wall: Rec. C.M. 4: 1935: 112

A very variable plant. The leaves are sometimes coarsely toothed and at other times almost entire; the involucral scales vary from linear-oblong and densely tomentose to linear and almost glabrous. Mr. Kirk describes the var. *colorata* as having the scales nearly glabrous, but they are densely tomentose in Mr. Colenso's type specimens and in all others that I have seen.

= arborescens x lacunosa

20. **O. excorticata** *Buch. in Trans. N.Z. Inst.* vi (1874) 241.—A small much-branched shrub or small tree 12–15 ft. high, with a trunk 1 ft. in diam.; bark loose, papery; branchlets grooved, and with the panicles, petioles, and leaves beneath clothed with dirty-white or buff tomentum. Leaves alternate, $1\frac{1}{2}$–4 in. long, $\frac{1}{2}$–1 in. broad, lanceolate or oblong-lanceolate, acute or acuminate, shortly petiolate, coriaceous, glabrous and finely reticulated above; lateral veins spreading, but hardly at right angles; margins flat, obscurely sinuate-dentate. Panicles longer than the leaves, branched, corymbose; pedicels slender, densely tomentose. Heads numerous, small, $\frac{1}{6}$–$\frac{1}{5}$ in. long; involucre narrow-turbinate; outer scales small, ovate, tomentose; inner linear-oblong, obtuse, villous at the tips. Florets about 12; ray-florets 5–7. Pappus-hairs slender, in one series. Achenes grooved, hispid.—*T. Kirk Students' Fl.* (1899) 270; *Cheesem. Man. N.Z. Fl.* (1906) 287.

North Island: Tararua Mountains, *Mitchell!* Mount Holdsworth, *T. P. Arnold!* Mount Hector, *B. C. Aston! Petrie!* South Island: Nelson—Mountains near Collingwood, *Dall!* Westland—Not uncommon on the western slopes of the Southern Alps. 3000–4500 ft. December–January.

21. **O. suavis** *Cheesem. in Trans. N.Z. Inst.* xxiv (1892) 409.—A densely branched shrub or small tree 6–18 ft. high; branches stout; branchlets, panicles, and under-surface of leaves clothed with pale-yellowish or fulvous tomentum. Leaves alternate, $\frac{3}{4}$–$1\frac{1}{2}$ in. long, $\frac{1}{2}$–$\frac{3}{4}$ in. broad, linear-oblong or oblong to ovate, obtuse at both ends, shortly petiolate, coriaceous or almost membranous, entire or obscurely sinuate, glabrous above; lateral veins conspicuous beneath, spreading almost at right angles. Panicles much longer than the leaves, slender, corymbose, much branched; pedicels slender,

T. 72: 33.

O. lacunosa x ilicifolia Arthurs Pass. Trans. 59 : 727

tomentose. Heads numerous, small, $\frac{1}{6}$–$\frac{1}{5}$ in. long; involucre turbinate; scales few, lax, linear-oblong or lanceolate, pubescent or villous. Florets 6–10; florets of the ray 3–6. Pappus-hairs in 1 series. Achenes linear, striate, pubescent.—*T. Kirk Students' Fl.* (1899) 272; *Cheesem. Man. N.Z. Fl.* (1906) 287.

SOUTH ISLAND: Nelson — Mountains near Collingwood, *Dall!* Mount Arthur Plateau, *T. F. C., F. G. Gibbs!* Upper Wangapeka, *P. Chalmers!* 3000–4500 ft. January–February.

A well-marked plant, distinguished by the pale fulvous tomentum, oblong obtuse leaves, and small heads collected in slender much-branched panicles.

22. **O. lacunosa** *Hook. f. Handb. N.Z. Fl.* (1867) 732.—A stout branching shrub or small tree 5–15 ft. high; branchlets, panicles, petioles, and leaves beneath densely clothed with pale ferruginous tomentum. Leaves alternate, 3–7 in. long, $\frac{1}{3}$–1 in. broad, narrow-linear or linear-lanceolate to linear-oblong, acute or acuminate, shortly petioled, quite entire or obscurely sinuate-toothed, coriaceous, glabrous and reticulated above; midrib very stout and prominent beneath, lateral veins strong, spreading at right angles and dividing the under-surface into numerous sunken interspaces; margins recurved. Panicles towards the tips of the branches, branched, slender, forming a corymbose mass 4–8 in. diam. Heads numerous, small, $\frac{1}{5}$ in. diam., on slender pedicels; involucre turbinate; scales few, laxly imbricate, tomentose or villous. Florets small, 8–12, about $\frac{1}{2}$ of them shortly rayed. Achenes grooved, silky.—*T. Kirk Students' Fl.* (1899) 270; *Cheesem. Man. N.Z. Fl.* (1906) 288; *Ill. N.Z. Fl.* i (1914) t. 89. O. alpina *Buch. in Trans. N.Z. Inst.* xix (1887) 215. Trans 40 : 295. Status?

NORTH AND SOUTH ISLANDS: Wellington—Tararua Mountains, *Buchanan;* Mount Hector, *B. C. Aston! Petrie!* Nelson—Heaphy River and mountains near the source of the Aorere, *Dall!* source of the Takaka, Mount Arthur Plateau, Mount Owen, *T. F. C.;* Mount Murchison, *W. Townson!* Lake Rotoroa, *W. T. L. Travers.* Canterbury—Harper's Pass, *Haast;* Poulter River, *Cockayne!* Westland—Teremakau Valley, *Petrie!* Mount Greenland, *Cockayne;* Franz Josef Glacier, *Cockayne.* 3000–5000 ft. January–February.

A well-marked plant, easily known by the large linear leaves clothed with rusty tomentum beneath, and transversely rugose from the numerous main veins spreading at right angles to the midrib. In the "Illustrations of the New Zealand Flora" I suggested that Buchanan's *O. alpina* was identical with *O. lacunosa.* This has been proved to be the case by Mr. Petrie, from an actual inspection of the locality from which *O. alpina* was originally obtained. See his remarks in Trans. N.Z. Inst. xl (1908) 295–96.

23. **O. Crosby-Smithiana** *Petrie in Trans. N.Z. Inst.* xliii (1911) 254.—A small densely branched shrub 4–8 ft. high, rarely more; branches stout, yellowish-brown, marked with the scars of the fallen leaves, leafy at the top only. Leaves closely packed, mixed with short pointed scales, articulated at the base of the short petiole, alternate, coriaceous, 2–5 in. long, $\frac{1}{10}$–$\frac{1}{6}$ in. broad, narrow-linear, quite entire or faintly sinuate, acute, margins very strongly revolute, often almost to the midrib, upper surface with a deep longitudinal groove and shallow transverse ones, under-surface with a stout and prominent rounded midrib, lateral veins strong, cutting up the surface into numerous sunken interspaces, the whole under-surface more or less clothed with yellowish-white floccose tomentum. Inflorescence at the tops of the branches, but good specimens not seen, apparently springing from clusters of short scale-like leaves. Panicles small, short, apparently with

few sparingly divided branches. Heads few, small; florets few; involucral scales in 2–3 series. Achenes narrow-linear, glabrous; pappus longer than the achene.

South Island: Otago—Dusky Sound, *A. Reischek!* The Hump (south of Lake Hauroko), *J. Crosby Smith! J. Speden!* 2000–3500 ft.

A distinct species, more closely allied to *O. lacunosa* than any other, but easily separated by the smaller size, more glabrous habit, much narrower leaves, and apparently smaller and more delicate inflorescence. But better flowering specimens are required before the affinities of the plant can be fully determined.

24. **O. moschata** *Hook. f. Handb. N.Z. Fl.* (1864) 127.—A much-branched shrub 4–12 ft. high, with a strong musky fragrance; branches stout, spreading; branchlets, inflorescence, and leaves beneath clothed with soft white densely appressed tomentum. Leaves alternate, close-set, $\frac{1}{3}$–$\frac{3}{4}$ in. long, obovate-oblong, obtuse, narrowed into a very short petiole, quite entire, coriaceous, glabrous or slightly pubescent above, veins altogether concealed below; margins flat. Corymbs small, lax or compact, on long axillary peduncles much exceeding the leaves; pedicels slender, tomentose. Heads few, $\frac{1}{4}$ in. long, campanulate or broadly turbinate; scales of the involucre in few series; the outer short, ovate, obtuse, tomentose; the inner linear-oblong, obtuse, pubescent or nearly glabrous. Florets 12–20; ray-florets 6–12, rather long. Achenes ribbed, silky.—*T. Kirk Students' Fl.* (1899) 271; *Cheesem. Man. N.Z. Fl.* (1906) 289; *Ill. N.Z. Fl.* i (1914) t. 90.

South Island: Canterbury—Arthur's Pass, *T. Kirk!* Upper Rakaia, *Haast!* Mount Arrowsmith, *Cockayne!* Rangitata Valley, *Potts!* Mount Cook district, abundant, *Haast, T. F. C.*, and others; Copeland Pass, *Cockayne.* Westland—Abundant in alpine districts from the Teremakau Valley southwards. Otago—Abundant in the Central and Lake districts to the Takitimu Mountains. *Incense-plant.* 2500–4500 ft. January–February.

Easily distinguished from its immediate allies by the pale greenish-grey colour, small obovate leaves, soft white tomentum, and broad many-flowered heads. It varies considerably in the size and shape of the leaves, but cannot be confounded with any other species. In South Canterbury and the western portions of Otago it often forms a predominant part of the subalpine scrub.

25. **O. Haastii** *Hook. f. Handb. N.Z. Fl.* (1864) 126.—A much-branched shrub 4–8 ft. high; branches stout, hoary with white pubescence. Leaves alternate, crowded, $\frac{1}{2}$–$1\frac{1}{4}$ in. long, oblong or oblong-ovate to elliptic-oblong, obtuse at both ends, shortly petioled, very coriaceous, glabrous and shining above, clothed with white appressed tomentum beneath; lateral veins obscure, spreading, but hardly at right angles. Corymbs numerous, lax or compact, on long naked peduncles much exceeding the leaves. Heads numerous, $\frac{1}{4}$–$\frac{1}{3}$ in. long; involucre cylindric; scales imbricated, pale straw-colour; outer smaller, broadly ovate, slightly pubescent; inner much larger, linear-oblong, obtuse, nearly glabrous. Florets 8–10; ray-florets 3–5, short, broad. Achenes narrow, grooved, pubescent.—*Bot. Mag.* t. 6592; *T. Kirk Students' Fl.* (1899) 272; *Cheesem. Man. N.Z. Fl.* (1906) 289.

South Island: Canterbury—Kowai River, *Petrie! T. F. C.;* Sloven's Creek, Waimakariri basin, *Cockayne;* Mount Arrowsmith, *Cockayne* and *R. M. Laing;* Upper Rakaia, *Haast!* Rangitata Valley, *Potts!* Ohau Glacier, *Haast.* Westland—Otira Gorge, *Cockayne.* Otago—Head of the Dart River, *H. J. Matthews;* Mount Dick, *Cockayne!* 1500–4500 ft. December–January.

Apparently a rare and local plant, seldom seen in any quantity.

26. **O. oleifolia** *T. Kirk in Trans. N.Z. Inst.* xi (1879) 463.—A much-branched shrub 5–8 ft. high; branches crowded, erect or ascending; branchlets grooved, hoary with fine appressed pubescence. Leaves alternate, 1½–3 in. long, ¼–½ in. wide, lanceolate or oblong-lanceolate, erect, acute or subacute, shortly petioled, very coriaceous, glabrous and finely reticulated above, clothed with white appressed tomentum beneath; veins obscure. Corymbs broad, rather lax, on slender naked peduncles much exceeding the leaves. Heads numerous, ¼–⅓ in. long; involucre cylindric; scales imbricate; the outer smaller, slightly tomentose; the inner longer, linear-oblong, almost glabrous or pubescent at the tips. Florets 4–8; ray-florets 2–4, short, broad. Achenes grooved, pubescent.—*Students' Fl.* (1899) 272; *Cheesem. Man. N.Z. Fl.* (1906) 289. O. angustata *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 337.

South Island: Canterbury — Ashburton Mountains, *Potts!* Upper Rangitata, *J. B. Armstrong!* Mount Arrowsmith, *Cockayne* and *R. M. Laing.* Otago—Lake Wakatipu, *Cockayne!* Greenstone Valley, *W. Willcox!* Dart Valley, *H. J. Matthews!* Resolution Island and Preservation Inlet, *J. D. Enys!* 1500–3500 ft. January.

Only differs from *O. Haastii* in the more erect habit and longer and narrower leaves. Intermediate forms have been collected, but the usual aspect of the plant is distinct.

27. **O. Willcoxii** *Petrie in Trans. N.Z. Inst.* xlv (1913) 266.—A sparingly branched shrub 4–8 ft. high; branches slender, diffusely spreading, terete or nearly so, finely grooved or striate, more or less clothed with soft hoary pubescence, becoming almost glabrous in age. Leaves distantly placed, alternate, 1½–2 in. long, ⅓–½ in. broad, elliptic-lanceolate to narrow elliptic-oblong, acute or subacute, tapering at the base into a short petiole, subcoriaceous, glabrous and brownish-green above, with evident midrib and veins, below clothed with soft white tomentum, venation obscure, margins entire or obscurely sinuate. Corymbs small, remote from the tops of the branches, heads few in number, usually from 4 to 8, ¼–⅓ in. long, broadly turbinate. Involucral bracts in 3–4 series; the lower short, ovate, acute; the upper longer, oblong-lanceolate. Florets 4–8; ray-florets 2–4, short, broad. Achenes grooved, pubescent.

South Island: Otago—In one or two localities on Queenstown Hill, Lake Wakatipu, *W. Willcox!*

Apparently a very rare and local species, so far only known from a single locality. Its nearest ally is evidently *O. oleifolia*, but the inflorescence is altogether different.

28. **O. nummularifolia** *Hook. f. Handb. N.Z. Fl.* (1864) 127.—A much and closely branched shrub 2–10 ft. high; branches stout, woody, scarred; younger ones often viscid, more or less clothed with whitish or yellowish stellate tomentum or almost glabrous. Leaves alternate, close-set, erect or spreading, ⅕–½ in. long, almost orbicular to broadly oblong or obovate, rounded at the tip, very shortly petiolate, excessively thick and coriaceous, shining and reticulate above, clothed with appressed stellate tomentum beneath; margins recurved. Heads ⅓–½ in. long, solitary, on axillary peduncles longer or shorter than the leaves. Involucre narrow-turbinate; scales in several series, closely imbricating, tomentose or pubescent or almost glabrous; outer short and broad; inner linear, obtuse. Florets 6–12; ray-florets 3–5, rather broad. Achenes pubescent.—*T. Kirk Students'*

O moschata x cymbifolia Lochy R., L. Wakatipu

Fl. (1899) 273; *Cheesem. Man. N.Z. Fl.* (1906) 290. O. Hillii *Col. in Trans. N.Z. Inst.* xx (1888) 194. Eurybia nummularifolia *Hook. f. Fl. Nov. Zel.* i (1853) 118.

North and South Islands: Mountain districts from the East Cape, Taupo, and the central volcanic plateau to Foveaux Strait, but local to the south of Lake Wanaka. Altitudinal range from 2000 to 4500 ft., but descending to sea-level in Colac Bay, Southland.

A variable plant, especially in the size and shape of the leaves, the extent to which the leaf-margins are revolute, the size of the heads, and the number of florets. There is a specimen in Mr. Petrie's herbarium with the heads collected in 3–5-flowered corymbs.

(Hk f.)

29. **O. cymbifolia** *Cheesem. in Trans. N.Z. Inst.* xxxix (1907) 445.—Very closely allied to *O. nummularifolia*, and very similar in size and habit of growth. Leaves spreading or deflexed, $\frac{1}{4}$–$\frac{1}{2}$ in. long, shortly petioled, oblong, obtuse, convex above, margins conspicuously revolute all round, hence boat-shaped with the cavity beneath, viscid and pitted above, beneath more or less clothed with stellate tomentum; veins obsolete. Heads similar to those of *O. nummularifolia*, but much less developed, and the scales of the involucre more tomentose.—O. nummularifolia *var.* cymbifolia *Hook. f. Handb. N.Z. Fl.* (1867) 732; *T. Kirk Students' Fl.* (1899) 273; *Cheesem. Man. N.Z. Fl.* (1906) 290.

South Island: Mountain districts but local; most plentiful in Nelson and Marlborough. Nelson—Wairau Gorge, *W. T. L. Travers, T. F. C.;* Upper Clarence Valley, *T. F. C.;* Lake Tennyson, *R. M. Laing!* Marlborough—Mount Fyfe, *H. J. Matthews! Cockayne;* Kaikoura Mountains, *T. Kirk!* Canterbury—Banks Peninsula, *R. M. Laing;* Hurunui Mountains, *W. T. L. Travers;* Mount Fenzl and Mount Potts, *Haast;* Mount Arrowsmith, *Cockayne* and *R. M. Laing;* Copeland Pass, *Cockayne.* Otago—Eyre Mountains, *Poppelwell.* Altitudinal range 2000–4000 ft.

The fully developed state of this plant has such a remarkably distinct appearance that I think it should be maintained as distinct from *O. nummularifolia*, although transitional forms are occasionally seen. T. 71: 95 & T. 72: 327.

30. **O. albida** *Hook. f. Handb. N.Z. Fl.* (1864) 128.—A small tree 10–20 ft. high; branchlets grooved, more or less hoary with white tomentum. Leaves alternate, quite entire, 2–4 in. long, oblong or ovate-oblong, obtuse or subacute, rounded or narrowed at the base, petiolate, coriaceous, farinose above when young, glabrous when old, clothed with soft white appressed tomentum beneath; margins undulate or nearly flat. Panicles large, broad, with spreading branches; pedicels short, tomentose or farinose. Heads numerous, $\frac{1}{4}$ in. long, subcylindric; involucral scales imbricate, farinose or tomentose; the outer short, obtuse; the inner linear-oblong, often ciliate. Florets 3–6; ray-florets 1–3. Pappus-hairs unequal, thickened at the tips. Achenes linear, grooved, pubescent.—*Students' Fl.* (1899) 273; *Cheesem. Man. N.Z. Fl.* (1906) 291. Eurybia albida *Hook. f. Fl. Nov. Zel.* i (1853) 118.

Mokau. Trans 57: 1926: 71

North Island: Spirits Bay to the North Cape, *T. Kirk! T. F. C.;* Ahipara to Herekino, *T. Kirk! T. F. C.;* Little Barrier Island, *T. F. C.;* Great Omaha, *T. Kirk!* coast between Coromandel and Thames, *T. Kirk! T. F. C., W. Townson!* Manukau Harbour, *T. F. C., J. Bishop!* coast near Raglan, *T. F. C.;* Waiapu (East Cape district), *T. Kirk!* April–May.

A very variable plant, the various forms of which require close examination.

O. avicenniaefolia × Cel. du rietii Trans 72:33

31. **O. angulata** *T. Kirk in Trans. N.Z. Inst.* xiii (1881) 384.—A much-branched shrub 8–12 ft. high; branches short, spreading, grooved, almost hoary. Leaves alternate, 1½–2½ in. long, 1 in. broad, oblong or broadly elliptic, rounded at the apex, truncate at the base, shortly petioled, coriaceous, clothed with appressed white tomentum beneath; margins undulate. Panicles spreading, exceeding the leaves. Heads ⅕ in. long; involucral scales laxly imbricating; the lower farinose; the upper linear, obtuse, ciliate or pubescent. Florets 3–5. Pappus-hairs unequal. Achenes strigose.—*Students' Fl.* (1899) 273; *Cheesem. Man. N.Z. Fl.* (1906) 291.

North Island: Mongonui County — Coast at Reef Point and near Ahipara, *T. F. C., H. Carse!* Not uncommon on cliffs from Tapotopoto Bay and Spirits Bay to the North Cape, *T. Kirk! T. F. C.* April–May.

This only differs from *O. albida* in the shorter and broader much more waved leaves, and, in my opinion, would be better treated as a form of that plant.

(Raoul)

32. **O. avicenniaefolia** *Hook. f. Handb. N.Z. Fl.* (1864) 127.—A small branching tree 8–20 ft. high; branchlets grooved and angular, more or less hoary with fine white tomentum. Leaves alternate, quite entire, 2–4 in. long, elliptic-lanceolate or oblong-lanceolate, subacute, narrowed into a rather long petiole, coriaceous, glabrous above, clothed with thin closely appressed white or buff tomentum beneath; veins finely reticulated, conspicuous on both surfaces; margins flat. Corymbs large, much-branched, long-peduncled, usually exceeding the leaves. Heads very numerous, small, ⅙–⅕ in. long, narrow; involucre cylindric; scales few, imbricate, glabrous or minutely pubescent. Florets 2 or 3, rarely 4; ray-florets 1 or rarely 2, sometimes wanting. Pappus-hairs in 1 series. Achenes silky.—*T. Kirk Forest Fl.* (1889) t. 111; *Students' Fl.* (1899) 274; *Cheesem. Man. N.Z. Fl.* (1906) 291. Eurybia avicenniaefolia *Hook. f. Fl. Nov. Zel.* i (1853) 120. Shawia avicenniaefolia *Raoul Choix* (1846) 45.

South Island, Stewart Island: Not uncommon throughout, ascending to 3000 ft. *Akeake.* January–February.

A well-marked species, easily distinguished by its large pointed leaves, many-flowered corymbs, and narrow few-flowered heads.

S. (not A.) Dunce 1916 p. 638

33. **O. paniculata** *Cheesem.*—A much-branched shrub or small tree 8–20 ft. high; branchlets grooved and angular, tomentose. Leaves alternate, 1½–3 in. long, oblong or ovate-oblong or broadly ovate, obtuse, shortly petiolate, coriaceous, glabrous above, clothed with thin closely appressed white tomentum beneath; veins finely reticulate; margins usually strongly undulate. Corymbs branched, peduncles usually shorter than the leaves. Heads sessile and fascicled on the branches of the corymb, small, narrow, ⅙–⅕ in. long. Involucre cylindric; scales few, imbricate, glabrous or nearly so; outer small, broadly ovate; inner much longer, linear-oblong, obtuse. Florets always solitary, tubular, hermaphrodite. Pappus-hairs numerous, in 1 series. Achenes rather broad, pubescent. —Shawia paniculata *Forst. Char. Gen.* (1776) 95, t. 48; *A. Rich. Fl. Nouv. Zel.* (1832) 243; *A. Cunn. Precur.* (1838) n. 434; *Raoul Choix* (1846) 18, t. 13; *T. Kirk Students' Fl.* (1899) 277. Eurybia Forsteri *Hook. f. Fl. Nov. Zel.* i (1853) 119. Olearia Forsteri *Hook. f. Handb. N.Z. Fl.* (1864) 127; *Cheesem. Man. N.Z. Fl.* (1906) 292. O. uniflora *Col. in Trans. N.Z. Inst.* xxii (1890) 469.

O. paniculata var viscosa T Trans 75:188
Ure River

Var. **elliptica** *T. Kirk l.c.*—Leaves narrower, linear-oblong or elliptic-oblong.

North and South Islands: From the East Cape southwards to Oamaru and Greymouth; often local, usually near the coast. Sea-level to 1500 ft. *Akiraho.* April–May.

The heads never contain more than one floret, which is invariably tubular and hermaphrodite. On account of the constancy of this character Mr. Kirk has proposed to revive Forster's genus *Shawia*, but, I think, quite unnecessarily. In *O. avicenniaefolia* the florets are sometimes reduced to 2, and occasionally there is no ray-floret, thus absolutely bridging over the gap between *O. paniculata* and the remaining *Olearieae*.

34. **O. coriacea** *T. Kirk Students' Fl.* (1899) 290.—A sparingly branched shrub 6–10 ft. high; branches stout, rigid, woody, often tortuous, naked below, densely leafy above, erect or spreading, more or less clothed with rough brown pubescence. Leaves alternate, shortly petiolate, $\frac{1}{2}$–$\frac{2}{3}$ in. long, $\frac{1}{3}$–$\frac{1}{2}$ in. broad, excessively thick and coriaceous, ovate or orbicular-ovate, obtuse, glabrous and reticulated above, beneath clothed with thick and dense brownish-white granular tomentum; margins recurved, sometimes so much so that the leaf becomes saddle-shaped. Corymbs axillary from the sides of the branches, 1–1$\frac{1}{2}$ in. long, sparingly branched. Heads $\frac{1}{4}$ in. long, shortly pedicelled; involucral scales in several series, laxly imbricating, thinly pubescent; outer short and broad; inner longer and narrower, oblong, obtuse; margins lacerate. Florets solitary and tubular in all the heads examined; corolla-tube white and tomentose. Achenes oblong, more or less clothed with white tomentum.—*Cheesem. Man. N.Z. Fl.* (1906) 290.

South Island: Marlborough—Awatere Valley, *T. Kirk!* Mount Fyffe, *T. Kirk! Cockayne! H. J. Matthews!* Ure Valley, *B. C. Aston!* Nelson—Jack's Pass, Hanmer, *C. E. Christensen.* March–April.

A very distinct species. Owing to the absence of flowering specimens its exact position in the genus remained uncertain for many years. The discovery of such by Mr. B. C. Aston has unexpectedly proved that the affinities of the plant are with *O. paniculata* (*O. Forsteri* Hook. f.), with which it agrees in the heads never having more than a single floret, which is invariably tubular and hermaphrodite. It has been suggested that such a discovery gives additional support to Kirk's action in re-establishing Forster's genus *Shawia*. But most botanists now discountenance the setting-up of genera depending solely upon a slight reduction in the numbers of a particular character.

35. **O. fragrantissima** *Petrie in Trans. N.Z. Inst.* xxiii (1891) 398.—An erect much-branched shrub 6–15 ft. high or more; bark dark red-brown or almost black; branches rigid, flexuous or zigzag, finely grooved. Leaves distant, alternate, $\frac{3}{4}$–1$\frac{1}{2}$ in. long, elliptic-lanceolate to elliptic-oblong or -ovate, acute, narrowed into a rather slender petiole, membranous, glabrous above, clothed with rather lax silky tomentum beneath; margins flat, quite entire. Inflorescence of alternate sessile glomerules $\frac{1}{2}$–$\frac{3}{4}$ in. diam., each containing 8–12 nearly sessile heads $\frac{1}{5}$ in. long, each head with a woolly bract at its base. Involucral bracts in 2 or 3 series, oblong, obtuse, densely woolly. Florets 4–8, yellowish; ray-florets 2–5, short and broad. Achenes grooved, silky.—*T. Kirk Students' Fl.* (1899) 274; *Cheesem. Man. N.Z. Fl.* (1906) 292.

South Island: Canterbury—Lake Forsyth, *T. Kirk!* various other localities on Banks Peninsula, *R. M. Laing, Cockayne.* Otago—Otago Heads, *Buchanan! Petrie!* near Dunedin, *Petrie! Thomson! H. J. Matthews!* Catlin's River, *Petrie!* Southland—Otautau, *Cockayne.* November–December.

A very distinct species, remarkable for the heads being congested into globose fascicles or glomerules. The flowers are deliciously fragrant, smelling like ripe peaches.

O. serpentina Simp. Trans 75 : 200
Mt. Duppa

36. **O. Hectori** *Hook. f. Handb. N.Z. Fl.* (1864) 128.—An erect much-branched deciduous shrub 5–15 ft. high; branches slender, grooved, glabrous; bark dark red-brown. Leaves in opposite fascicles, variable in size and shape, ¾–1½ in. long, linear-obovate or linear-spathulate to oblong or obovate, obtuse, narrowed into a slender petiole, thin and membranous, glabrous above when mature, silky when young, beneath clothed with thin silvery tomentum; margins flat, entire. Heads in opposite fascicles of 2–5; peduncles ¼–½ in. long, slender, drooping, silky. Involucre broad and shallow, cup-shaped; bracts in 2 series, lax, spreading, linear-oblong or -obovate, obtuse, woolly. Florets 20–25; ray-florets 12–17, small, with a narrow ray; disc-florets about 8, much larger, mouth funnel-shaped. Achenes linear-obovoid, grooved, silky.—*T. Kirk Students' Fl.* (1899) 274; *Cheesem. Man. N.Z. Fl.* (1906) 293.

South Island: Marlborough — Pelorus Sound, *J. Rutland! J. H. Macmahon!* Otago—Lake district, *Hector* and *Buchanan!* Kaitangata, Catlin's River, Kawarau Gorge, Matukituki Valley, near Invercargill, *Petrie!* Otautau, *Cockayne;* Tapanui, *H. J. Matthews!* Garvie Mountains, *Poppelwell.* Sea-level to 3000 ft. October–November.

37. **O. odorata** *Petrie in Trans. N.Z. Inst.* xxiii (1891) 399.—An erect much-branched shrub 6–12 ft. high; branches divaricating, stout, terete, grooved. Leaves opposite, usually fascicled, ⅓–1 in. long, linear-spathulate or linear-obovate, rounded at the tip, narrowed into very short petioles or almost sessile, coriaceous, glabrous or silky above, clothed with soft white tomentum beneath; margins flat, entire. Heads in opposite fascicles of 2–5 on short arrested branchlets; peduncles short, stout, silky. Involucre broadly campanulate; bracts in 3–4 series, linear-oblong, obtuse, dark-brown, viscid and glandular. Florets numerous, 20–35; ray-florets 8–18; short; corolla of disc-florets viscid and glandular. Achenes silky.—*T. Kirk Students' Fl.* (1899) 275; *Cheesem. Man. N.Z. Fl.* (1906) 293.

South Island: Mountain districts in Canterbury, Westland, and Otago, not uncommon. 1000–3000 ft. January–February.

Closely allied to *O. virgata*, but distinguished by the terete branchlets, larger leaves, many-flowered heads, and viscid and glandular involucral bracts.

38. **O. laxiflora** *T. Kirk Students' Fl.* (1899) 275.—A large erect much-branched shrub 6–12 ft. high; branches slender, divaricating, sometimes almost pendulous, terete or obscurely tetragonous. Leaves opposite or in opposite fascicles, ½–1 in. long, narrow linear-spathulate or linear-oblong, obtuse, narrowed into very short petioles, coriaceous, glabrous above, beneath clothed with closely appressed white tomentum. Heads numerous, 5–15, in opposite fascicles on short arrested branchlets; peduncles slender, ¾ in. long, glabrate or silky. Involucre campanulate; bracts few, lax, linear-oblong, villous at the tips. Florets 6–8; ray-florets 3–4, broad. Achenes grooved, silky.—*Cheesem. Man. N.Z. Fl.* (1906) 293.

South Island: Westland—Hokitika, *H. Tipler!*

Very similar to *O. odorata* in habit and appearance, but the fascicles are larger and much more lax, the peduncles longer, the involucral bracts not viscid nor glandular, and the florets much fewer in number. I have seen only two specimens.

39. **O. virgata** *Hook. f. Handb. N.Z. Fl.* (1864) 128.—An erect much-branched shrub 4–10 ft. high, often forming dense thickets; branches spreading, stout or slender, tetragonous or almost terete, smooth or grooved,

glabrous or pubescent when young; bark dark red-brown. Leaves opposite or in opposite fascicles, ¼–½ in. long, linear-obovate or linear-spathulate, obtuse, narrowed into a short petiole or sessile, coriaceous, glabrous or silky above, clothed with white appressed tomentum beneath. Heads solitary or fascicled, on short arrested opposite branchlets, shortly pedunculate or almost sessile. Involucre broadly turbinate; bracts in about 3 series, linear-oblong, tomentose or villous or almost glabrous. Florets 5–12; ray-florets 3–6, short, slender; disc-florets often with villous tips to the corolla-lobes. Achenes small, linear, glabrous or slightly pubescent. — *T. Kirk Students' Fl.* (1899) 275; *Cheesem. Man. N.Z. Fl.* (1906) 294. O. quinquefida *Col. in Trans. N.Z. Inst.* xxviii (1896) 596. O. aggregata *Col. l.c.* 597. O. parvifolia *Col. l.c.* 598. Eurybia virgata *Hook. f. Fl. Nov. Zel.* i (1853) 169.

(a) Var. **ramuliflora** *T. Kirk Students' Fl.* (1899) 276.—Leaves in opposite fascicles of 2–6, rather larger, ½–¾ in. long, flat. Heads more numerous, in fascicles of 2–6; peduncles slender, often ¼ in. long or more, silky. Involucres tomentose or villous. Florets 7–12.—O. ramuliflora *Col. in Trans. N.Z. Inst.* xxii (1890) 467.

North and South Islands, Stewart Island: From the Thames Valley and Rotorua southwards, not uncommon. Sea-level to 3500 ft. December–January.

A variable plant. Var. *ramuliflora* approaches *O. odorata*, but differs in the corolla of the disc-florets not being viscid and glandular.

40. **O. divaricata** *Cockayne in Rep. Bot. Surv. Stewart Id.* (1909) 44.—An erect shrub 3–4 ft. high; branches slender, stiff, divaricating; bark pale, smooth or slightly ridged; ultimate twigs slightly pubescent. Undersurface of leaves, pedicels, and involucral bracts more or less densely covered with short rusty hairs. Leaves dark-green, obovate, cuneate at the base and narrowed into a short petiole, inserted 2–3 together on short lateral branchlets. Flower-heads ¼ in. long, cylindrical or nearly so, solitary or 2–4 on short lateral branchlets; pedicels slender, ⅓ in. long, spreading. Involucral bracts short, purplish-green, ovate or oblong, obtuse, pilose with rusty hairs. Ray-florets 4; disc-florets 3. Achene faintly pilose.

Stewart Island: Slopes of Table Hill, in sheltered subalpine meadows, *Cockayne!* February.

Dr. Cockayne remarks that this is distinguished from *O. odorata* by the few florets and rusty tomentum; and from all the forms of *O. virgata* by the stiffer branches, more divaricating habit, rusty tomentum, few florets, and pale bark. I have seen only a single specimen, and the above description is mainly drawn up from Cockayne's.

41. **O. lineata** *Cockayne in Trans. N.Z. Inst.* xliii (1911) 173.—Allied to *O. virgata*, but easily separated by the much more slender and often pendulous branches, which are grooved and angled, and often silky-pubescent. Leaves in distant fascicles which are often 1–1½ in. apart, ½–2 in. long, excessively narrow-linear, glabrate or silky above, clothed with white tomentum beneath; margins much revolute. Heads in few-flowered fascicles at the base of the leaves; peduncles short, slender. Involucre broadly campanulate; bracts villous or tomentose. Ray-florets 8–14; disc-florets 6–12. Achene glabrous. — O. virgata *var.* lineata *T. Kirk Students' Fl.* (1899) 276; *Cheesem. Man. N.Z. Fl.* (1906) 294.

South Island: Not uncommon from the south of Westland through the interior of Otago. Stewart Island: Only seen in the Rakiahua Valley, *Cockayne.* January.

42. **O. Solandri** *Hook. f. Handb. N.Z. Fl.* (1864) 128.—An erect much-branched shrub 5–15 ft. high; branches stout, spreading, angled, often viscid, usually more or less clothed with pale-yellowish pubescence. Leaves of young plants opposite, $\frac{1}{3}$–$\frac{1}{2}$ in. long, linear-obovate or -spathulate, narrowed into short petioles, membranous, flat, white beneath; of mature plants in opposite fascicles, $\frac{1}{5}$–$\frac{1}{3}$ in. long, narrow-linear or linear-obovate, obtuse, narrowed into very short petioles, coriaceous, glabrous above, beneath clothed with pale-yellowish tomentum; margins recurved. Heads $\frac{1}{4}$–$\frac{1}{3}$ in. long, solitary, sessile, terminating short lateral branchlets. Involucre narrow-turbinate; scales in 3–4 series, numerous, imbricate, obtuse or subacute, bright fulvous, pubescent or viscid. Florets 8–20; ray-florets 5–14, ray short. Achenes grooved, pubescent.—*T. Kirk Students' Fl.* (1899) 276; *Cheesem. Man. N.Z. Fl.* (1906) 294. O. fasciculifolia *Col. in Trans. N.Z. Inst.* xxv (1893) 330. O. consimilis *Col. l.c.* xxviii (1896) 596. Eurybia Solandri *Hook. f. Fl. Nov. Zel.* i (1853) 119.

North Island: From the North Cape southwards, plentiful near the coast. South Island: Queen Charlotte and Pelorus Sounds, *Banks* and *Solander! J. Rutland! J. H. Macmahon!* D'Urville Island, *Bryant!* Awatere Valley, *H. J. Matthews!* Sea-level to 1500 ft. February–May.

Although most plentiful near the sea, it is occasionally seen in several localities in the interior of the North Island.

6. **PLEUROPHYLLUM** Hook. f.

Tall handsome silky robust perennial herbs. Leaves mostly radical, large, entire, many-nerved. Heads large, racemed at the top of the stem. Involucre broadly campanulate or hemispherical; bracts in 2–3 series, herbaceous. Receptacle flat, pitted. Ray-florets female, ligulate, in 1–3 series; ligule long or short. Disc-florets many, regular, tubular, campanulate at the mouth, 4–5-toothed. Anthers shortly and obtusely auricled at the base. Style-branches of the disc-florets flattened, with lanceolate tips. Achenes compressed, striated, densely setose. Pappus-hairs in 2–3 series, copious, rigid, scabrid, unequal.

The genus is limited to the 3 following species, and is confined to the outlying islands to the south of New Zealand. It is very closely allied to *Celmisia*, from which it is separated rather by the very distinct and peculiar habit than by any structural characters of importance.

Ray-florets with a conspicuous ray. Leaves large, 6–18 in., sessile by a broad base	1. *P. speciosum.*
Ray-florets short, inconspicuous. Leaves large, 1–4 ft., petiolate, green above	2. *P. criniferum.*
Ray-florets short, inconspicuous. Leaves smaller, 6–12 in., petiolate, white and silvery on both surfaces	3. *P. Hookeri.*

1. **P. speciosum** *Hook. f. Fl. Antarct.* i (1844) 31, tt. 22, 23.—Leaves chiefly radical, spreading horizontally all round the base of the stem, 6–18 in. long, 4–10 in. broad, broadly ovate or obovate, sessile by a broad base, thick and coriaceous, quite entire, furnished with 15–20 stout longitudinal parallel ribs, villous and tomentose beneath, above slightly setose, with the bristles more or less mixed with moniliform hairs. Cauline leaves few, oblong-lanceolate. Flowering stems several, 1½–3 ft. high, ending in a raceme of 8–20 heads; bracts numerous, linear. Heads 1½–2½ in. diam.; disc-florets dark-purple; ray-florets with a conspicuous ligule, light-purple

or almost whitish. Achenes densely silky-strigose. Pappus-hairs not thickened at the tips.—*Hook. f. Handb. N.Z. Fl.* (1864) 129; *T. Kirk in Trans. N.Z. Inst.* xxiii (1891) 433; *Students' Fl.* (1899) 277; *Cheesem. Man. N.Z. Fl.* (1906) 295; *Subantarct. Is. N.Z.* ii (1909) 413.

Auckland and Campbell Islands: Abundant from sea-level to nearly 1000 ft. December–January.

Of the many handsome herbaceous plants found in the Auckland and Campbell Islands this is one of the finest. Its rosettes of huge ribbed leaves, pressed flat to the ground, are frequently more than 4 ft. in diameter, and from the centre rise from 4–6 or even as many as 8–10 tall flowering stems 1½–3 ft. high, each of them bearing numerous rayed flower-heads 1½ in. diam. The rays are usually lilac or whitish-purple; the disc is a deep rich purple.

2. **P. criniferum** *Hook. f. Fl. Antarct.* i (1844) 32, tt. 24, 25.—Radical leaves variable in size and shape, 1–4 ft. long, 4–12 in. broad, orbicular-ovate or broadly oblong to ovate-lanceolate or obovate-lanceolate, acute, narrowed into a sheathing petiole of variable length, firm but membranous, clothed with thin white tomentum beneath, above setose with moniliform hairs intermixed; principal nerves 8–16, parallel, but following the outline of the leaf; margins remotely and minutely spinulose-serrate. Cauline-leaves smaller and narrower, sessile, clothed with thin white tomentum on both surfaces. Flowering stem stout, 2–6 ft. high; raceme of 15–30 heads or more. Heads subglobose, discoid, 1–1½ in. diam., purple; involucral bracts ovate-lanceolate, margins ciliate. Ray-florets with a very short and inconspicuous 2–3-fid ligule. Achenes silky-strigose. Pappus-hairs slightly thickened at the tips.—*Handb. N.Z. Fl.* (1864) 129; *T. Kirk in Trans. N.Z. Inst.* xxiii (1891) 434; *Students' Fl.* (1899) 278; *Cheesem. Man. N.Z. Fl.* (1906) 295; *Subantarct. Is. N.Z.* ii (1909) 413. P. Hombronii *Decne. in Voy. Astrol. et. Zel.* (1853) 36. Albinea orisegenesa *Homb. and Jacq. Voy. Astrol. et Zel.* (1853) 37, t. 4.

Auckland and Campbell Islands, Antipodes Islands: Abundant in wet peaty ground from sea-level to over 1000 ft. December–January.

Almost as fine a species as the preceding, from which it differs in its suberect petiolate leaves, taller scapes, which sometimes are over 4 ft. in height, and in the flower-heads being without rays. The entire plant dies to the ground in winter, leaving only hibernating leaf-buds enclosed in the remains of the decaying leaves of the previous season. Hooker's plate of the inflorescence is excellent; but, unfortunately, the artist has inadvertently figured the leaf of *P. speciosum* in mistake for that of this species.

3. **P. Hookeri** *Buch. in Trans. N.Z. Inst.* xvi (1884) 395 (excl. t. 37).—Leaves all radical, 6–12 in. long, 3–4 in. broad, obovate or oblong-obovate, acute or acuminate, narrowed into a short broad petiole, coriaceous, clothed on both surfaces with rather loose white and silvery tomentum; principal nerves 8–12, slender; margins entire or minutely denticulate. Flowering stems 1–3, 1½–2 ft. high, strict, silky-tomentose, naked below excepting for 1–3 narrow-linear bracts; raceme of 12–24 heads. Heads subglobose, discoid, ¾ in. diam.; involucral bracts narrow-linear, acuminate. Ray-florets few, with a very short and inconspicuous 2-lobed ligule. Achene silky. Pappus-hairs hardly thickened above.—*T. Kirk Students' Fl.* (1899) 278; *Cheesem. Man. N.Z. Fl.* (1906) 296; *Subantarct. Is. N.Z.* ii (1909) 414; *Ill. N.Z. Fl.* i (1914) t. 92; *Vasc. Fl. Macquarie Id.* (1919) 28. P. Hookerianum *T. Kirk in Trans. N.Z. Inst.* xxiii (1891) 435, t. 40. P. Gilliesianum *T. Kirk l.c.* xxiii (1891) 435.

AUCKLAND AND CAMPBELL ISLANDS: Upland meadows, usually above 500 ft., and ascending to over 1000 ft., *Buchanan ! T. Kirk ! Cockayne*, and others. MACQUARIE ISLAND: Plentiful in most parts of the island, and reaching to almost the summits of the hills, *Fraser, Scott, A. Hamilton ! H. Hamilton !*

Easily separated from the preceding by the smaller size, silvery-tomentose acuminate leaves, and by the shorter rigid scapes with fewer and smaller heads. The long sage-green leaves and large purple flowers render it a very attractive plant.

7. **CELMISIA** Cass.

Perennial herbs, usually tufted or with a short creeping rhizome, rarely with a procumbent or suberect branched stem. Leaves all radical and rosulate, or cauline and densely imbricated, narrowed into a sheathing base, usually clothed beneath with appressed white or buff tomentum. Scapes or peduncles long or short, rarely almost wanting, bracteate. Heads large, solitary, radiate. Involucre broadly hemispherical; bracts imbricated in several or many series, narrow, pubescent or cottony or glandular. Receptacle flat or convex, pitted. Ray-florets female, in a single row, ligulate; ligule spreading, flat or revolute, often long, always white. Disc-florets numerous, hermaphrodite, tubular, 5-lobed. Anthers usually sagittate at the base, with short tails. Style-branches flattened, tipped with long or short appendages. Achenes linear, slightly compressed or angled, with 1–3 prominent ribs on each side. Pappus copious, of numerous unequal scabrid bristles.

The genus *Celmisia*, which is confined to New Zealand, with the exception of one species found in Australia and Tasmania, forms one of the chief ornaments of the montane and alpine flora of the Dominion, the various species usually composing a large proportion of the vegetation, especially in the South Island, where the mountain slopes and valleys are often whitened for miles from the abundance of their large daisy-like flowers. With few exceptions, the species are exceedingly difficult of discrimination. This is especially the case with *C. coriacea, discolor, petiolata*, and *spectabilis*, all of which run into forms which are easily distinguishable by the eye, but which it is almost impossible to define in precise language. As the flower-heads are very similar throughout the genus, except in size, the specific characters are almost wholly founded on the vegetative organs. The size, shape, and texture of the leaves, the nature of the tomentum clothing the under-surface, the differences in the leaf-sheaths, the length, stoutness, and indumentum of the scapes, and the peculiarities of the involucral bracts are all made use of. Of course, these are essentially variable characters, and can only be safely employed in combination. But in *Celmisia*, as in other large genera of the New Zealand flora, the species, such as they are, must be regarded as founded on an aggregation of several small prevalent characters rather than on conspicuous and important differences.

A. Suffruticose. Stems woody, branched; branches elongated. Leaves imbricated along the branches.

Stems 3–12 in., much branched. Leaves $\frac{1}{4}$–$\frac{1}{2}$ in., linear-subulate, green on both surfaces, glabrous or glandular .. 1. *C. lateralis.*

Stems 2–8 in., sparingly branched. Leaves erect, $\frac{1}{4}$–$\frac{1}{2}$ in. long, linear-oblong, white and cottony beneath .. .. 2. *C. ramulosa.*

Stems 6–12 in., slender, sparingly branched. Leaves laxly imbricating, spreading or reflexed, $\frac{1}{2}$–$\frac{3}{4}$ in., lanceolate, sparsely clothed with lepidote scales beneath .. .. 3. *C. Gibbsii.*

Stems 1–3 ft., prostrate. Leaves $\frac{1}{2}$–1 in., linear-spathulate, obtuse; margins revolute .. .. 4. *C. rupestris.*

Stems 1–4 ft., procumbent or suberect. Leaves spreading, 1–$1\frac{1}{2}$ in., linear, acute; margins flat .. .. .. 5. *C. Walkeri.*

B. Herbaceous, but often woody at the base. Branches usually short. Leaves crowded, usually more or less rosulate. Disc-florets yellow, never purple.

* Leaves more or less toothed or serrate, clothed with white or buff tomentum beneath (glabrate in *C. prorepens*).

Leaves 3–7 in. × ¾–1½ in., linear-oblong, crenate-dentate, white beneath. Scapes 6–18 in. Involucral bracts very numerous .. .. 6. *C. densiflora.*

Stems stout, woody at the base. Leaves ½–1½ in. long, ¼–⅓ in. broad, oblong or oblong-obovate, imbricated, glabrous or nearly so above, covered with white tomentum beneath; sheaths short and broad. Scapes 1½–3 in. long. Heads ¾–1 in. diam. .. .. 7. *C. brevifolia.*

Stems branched at the base, often forming broad flat cushions. Leaves ¾–1½ in. long, ⅓–½ in. broad, obovate-spathulate to oblong-spathulate, viscid, coriaceous, white beneath. Scapes 3–5 in., slender .. .. .. 8. *C. discolor.*

Stems short, branched at the base. Leaves ⅓–¾ in. long × ⅕–⅓ in. broad, obovate-spathulate to elliptic-oblong, contracted into a distinct petiole, and then expanded into a broad sheath, glabrous above, silvery-white beneath. Scapes few, short .. .. 9. *C. intermedia.*

Stems woody and much branched below, forming dense tufts. Leaves imbricated, 1–2 in. × ⅕–¼ in., linear or linear-spathulate, glabrous or viscid above, covered beneath with silvery-white tomentum. Scapes 3–6 in. Heads ¾–1½ in. diam. .. .. 10. *C. novae-zealandiae.*

Leaves 1–3 in. × ¼–¾ in., oblong or spathulate, dull-green above, white with thin appressed tomentum beneath or glabrous, membranous .. .. 11. *C. Sinclairii.*

Leaves 3–8 in. × ½–1 in., linear-oblong or lanceolate, dark-green above, white beneath, coriaceous. Scape slender, flexuose, glabrate .. .. 12. *C. Lindsayi.*

Leaves 1–2½ in. × ½–¾ in., obovate-spathulate, plaited above, clothed with lax soft white tomentum beneath or on both surfaces .. .. 13. *C. incana.*

Leaves 1½–3 in. × ½–1 in., oblong to oblong-spathulate, greenish-grey and plaited above, white beneath; margins revolute. Scapes with numerous linear bracts .. 14. *C. Haastii.*

Leaves ½–¾ in. × ⅓ in., linear-spathulate, plaited above, beneath clothed with silvery-grey tomentum. Scapes 3–5 in.; bracts numerous, linear. Heads ¾–1 in. diam. 15. *C. Poppelwellii.*

Leaves 1½–3 in. × ½–1 in., linear-oblong to linear-obovate, green on both surfaces, rugose above .. .. .. 16. *C. prorepens.*

Leaves 2–4 in. × ½–¾ in., narrow obovate-spathulate, upper surface green and glabrous, clothed with whitish tomentum beneath. Scapes 6–8 in.; bracts numerous .. .. 17. *C. Cockayniana.*

Leaves 1–5 in. × ½–1 in., obovate-oblong to linear-oblong, serrulate, buff or white beneath. Scape 2–10 in., with linear bracts .. .. 18. *C. hieracifolia.*

Leaves 4–8 in. × 1–2 in., obovate-lanceolate, acutely serrate, buff beneath. Scape 6–18 in., with broad leafy bracts .. 19. *C. Dallii.*

Leaves 6–12 in. × 1½–2½ in., lanceolate, acutely serrate, white beneath. Scape 1–2 ft., with linear bracts .. 20. *C. holosericea.*

** Leaves entire (or if toothed very obscurely so), clothed with white or buff tomentum beneath (glabrate in *C. Mackaui*).

† Leaves 3–16 in. × ¼–2½ in., oblong or oblong-lanceolate or linear-oblong, coriaceous or almost membranous, not rigid.

Leaves 6–16 in. × 1½–2½ in., oblong or oblong-lanceolate, under-surface with velvety ferruginous tomentum; sheaths snow-white .. .. 21. *C. Traversii.*

Leaves 3–9 in. × 1–2 in., ovate-oblong or oblong, cordate at the base, under-surface with red-brown velvety tomentum; sheaths brown or purple .. .. .. 22. *C. cordatifolia.*

C. allanii Martin 65: 181.
" var. canescens martin
C. durietzii Chin. & Allan
C. virgata var. aurea Adv. 73: 169.
C. speciosa Simp. 75: 200

Leaves 4–14 in. × ¾–2 in., oblong to oblong-lanceolate or linear-oblong, under-surface with appressed white tomentum or almost glabrous; midrib and petiole purple .. 23. *C. petiolata.*

Allied to *C. petiolata*, but stouter in all its parts, and more rigid and erect. Leaves 4–8 in. × 1¼–1¾ in., thick and coriaceous, tomentum of under-surface usually ferruginous 24. *C. rigida.*

Leaves 3–12 in. × ¾–2½ in., oblong to oblong-lanceolate, under-surface with white satiny tomentum; sheaths snow-white .. .. 25. *C. Rutlandii.*

Leaves 3–6 in. × ¼–1 in., linear-oblong, under-surface with thick densely matted white or buff woolly tomentum; sheaths snow-white .. .. 26. *C. spectabilis.*

Leaves 1½–3 in., oblong or linear-oblong, acute at both ends, under-surface with soft white tomentum; sheaths slightly cottony .. .. 27. *C. dubia.*

†† Leaves 3–18 in. × ¼–⅝ in., linear or linear-lanceolate or linear-ensiform, very rigid and coriaceous.

Leaves 6–18 in. × ¼–⅓ in., ensiform, acute, ribbed above, beneath with satiny appressed tomentum. Midrib very stout .. .. 28. *C. Armstrongii.*

Leaves 6–18 in. × ½–¾ in., dagger-shaped, narrowed to an acuminate rigid tip, upper surface with 2 stout longitudinal plaits, white and silvery beneath; midrib not evident .. .. 29. *C. Petriei.*

Leaves 9–18 in. × ¼–⅓ in., narrow-ensiform, tapering into an almost pungent point, even or finely grooved above, white beneath .. .. 30. *C. Lyallii.*

Closely allied to *C. Lyallii*, but leaves much less rigid, not drawn out into an almost pungent point. Upper surface dark-green; under-surface clothed with dense white silky tomentum .. .. 31. *C. pseudo-Lyallii.*

Leaves 3–5 in. × ¼ in., linear, viscid, grooved on both surfaces, white with appressed tomentum beneath. Scape and involucre viscid .. .. 32. *C. viscosa.*

††† Leaves 6–24 in. × ¾–4 in., lanceolate or oblong-lanceolate, coriaceous but not rigid.

Leaves 8–20 in. × 1½–3 in., lanceolate or spathulate-lanceolate, under-surface with soft white or buff tomentum. Achene glabrous .. .. 33. *C. Hookeri.*

Leaves 6–10 in. × 1–2 in., lanceolate or oblong-lanceolate, under-surface with thin whitish tomentum. Achene silky .. .. 34. *C. verbascifolia.*

Leaves 6–20 in. × 2–4 in., lanceolate, acuminate, glabrous on both surfaces, or very slightly cottony beneath .. 35. *C. Mackaui.*

Leaves 6–24 in. × ¾–3 in., lanceolate, acute, above coated with a thin pellicle, beneath with appressed silvery tomentum. Achene pilose .. .. 36. *C. coriacea.*

Leaves yellowish-green, 8–16 in. × 1½–2 in., linear-lanceolate or ensiform, rigid, erect, margins recurved, midrib yellowish-orange. Heads 1½–2 in. diam. Achene pubescent .. 37. *C. lanceolata.*

Leaves 6–22 in. × ½–1¼ in., linear-lanceolate, coriaceous, grooved above, white with appressed tomentum beneath. Scape stout, and with the involucre woolly and cottony 38. *C. Monroi.*

Leaves 6–18 in. × ½–1 in., linear-lanceolate, membranous, flat above, with soft white tomentum beneath. Scape slender, and with the involucre glabrate or slightly cottony 39. *C. Adamsii.*

Leaves numerous, forming dense clumps, spreading or curved, 4–15 in. long, ¼–⅔ in. broad, narrow-linear, glabrous above, coated with silvery-white tomentum, coriaceous. Scapes stout, numerous, covered with snow-white tomentum. Heads 1–1½ in. diam. .. .. .. 40. *C. major.*

C. bonplandii S. & T. 72: 34
C. polyrena d 75: 201.
C. clavata
C. ramulosa var tuberculata S. & T. 72: 34

†††† Leaves 1–20 in. × $\frac{1}{12}$–1½ in., very narrow-linear, tufted, membranous, grassy.

Leaves 3–15 in. × $\frac{1}{12}$–$\frac{1}{6}$ in., membranous or subcoriaceous, rounded or channelled above and almost glabrous; margins strongly revolute, under-surface white and silvery. Scapes very slender; heads ½–¾ in. diam.	41. *C. gracilenta.*
Leaves 3–15 in. × $\frac{1}{12}$–$\frac{1}{6}$ in., flat, thin and membranous, and almost glabrous above; beneath clothed with white tomentum. Scapes slender, clothed with cottony tomentum. Heads ¾–1 in. diam.	42. *C. graminifolia.*
Leaves 6–20 in. × ½–1½ in., thin and membranous, often almost flaccid, upper surface glabrous or nearly so; under-surface white and silvery. Scapes long and slender; bracts numerous. Heads ¾–1½ in. diam.	43. *C. Morgani.*
Rhizome stout, woody, branched. Leaves at the tips of the branches, ½–2½ in. × $\frac{1}{30}$–$\frac{1}{15}$ in., very narrow-linear. Scapes solitary. Heads large for the size of the plant, ½–¾ in. diam.	44. *C. alpina.*

††††† Small species. Leaves ½–3 in. × $\frac{1}{20}$–⅓ in. (sometimes 3–4 in. in *C. linearis*), variable in shape.

Leaves 1–4 in. × $\frac{1}{6}$–⅕ in., narrow-linear; margins recurved. Scape stout, densely woolly	45. *C. linearis.*
Leaves ⅓–1 in. × $\frac{1}{20}$ in., acerose, pungent, silvery beneath. Scape very slender	46. *C. laricifolia.*
Leaves ½–1 in. × $\frac{1}{6}$–¼ in., linear-spathulate, silky on both surfaces. Scape stout, tomentose and villous	47. *C. Hectori.*
Leaves 1½–2 in. × ⅕ in., narrow subulate-lanceolate, tapering from the base to a subacute tip, both surfaces covered with lax buff tomentum. Scape stout, densely woolly, 1–2½ in. long. Heads 1–1½ in. diam.	48. *C. compacta.*
Leaves 1–1½ in. × ¼–⅓ in., linear-oblong, clothed with long silky hairs on both surfaces. Scape stout, densely villous	49. *C. Macmahoni.*
Leaves ⅓–1 in. × ⅛–¼ in., lanceolate, acute, white beneath. Scape slender, glabrate or slightly cottony	50. *C. parva.*

†††††† Small, densely tufted species, often forming extensive carpets. Leaves ⅕–1 in., very narrow-linear, densely imbricating round the stem and forming a hard rosette. Heads sessile among the uppermost leaves.

Leaves ⅓–1 in. × $\frac{1}{12}$ in., linear-subulate. Head ½–1 in. diam.	51. *C. sessiliflora.*
Leaves ⅕–½ in. × $\frac{1}{30}$ in., narrow linear-subulate. Head ¼–½ in.	52. *C. argentea.*

*** Leaves entire or serrate, perfectly glabrous on both surfaces, or with minute glandular pubescence only.

Leaves ¼–⅔ in. × ⅛–⅙ in., linear-spathulate, obtuse, green and glabrous, narrowed into short cottony petioles ..	53. *C. bellidioides.*
Forms cushion-shaped patches. Leaves ⅓–½ in. × ⅛–⅕ in., obovate-oblong or linear-oblong, upper surface setulose with minute denticles, glabrous beneath	54. *C. Thomsoni.*
Leaves ½–1½ in. × ¼–½ in., oblong-spathulate, acute, serrate, glandular-pubescent	55. *C. glandulosa.*
Leaves 2–4 in. × ½–¾ in., oblong-spathulate, glabrous above, thinly tomentose beneath; margins distantly dentate. Scapes 8–12 in. high. Heads 1–1½ in. diam.	56. *C. glabrescens.*

C. Herbaceous. Leaves rosulate. Disc-florets purple.

Leaves 1–4 in. × ⅛–⅓ in., linear, coriaceous, shining, glabrous	57. *C. vernicosa.*
Leaves 3–5 in. × ½–¾ in., lanceolate, grooved and sparingly tomentose beneath	58. *C. Campbellensis.*

1. **C. lateralis** *Buch. in Trans. N.Z. Inst.* iv (1872) 226, t. 15.—Stems 3–12 in. long or more, slender, procumbent, woody at the base, much and closely branched, often forming compact patches; branches crowded, ascending or suberect. Leaves very numerous, densely crowded, spreading

at the base but usually incurved at the tips, $\frac{1}{4}$–$\frac{1}{2}$ in. long, linear-subulate, acute or apiculate, flat above but slightly convex beneath, green on both surfaces, glabrous or glandular-ciliate at the margins and apex, base with a short and broad membranous slightly cottony sheath. Peduncles slender, 2–3 in. long, often numerous; terminal and lateral, glandular-pubescent or cottony; bracts linear-subulate. Heads $\frac{1}{2}$–$\frac{3}{4}$ in. diam.; involucral bracts subulate-lanceolate, acute, glandular and silky, margins often scarious. Rays numerous, narrow, $\frac{1}{3}$ in. long. Achene linear, silky.—*T. Kirk Students' Fl.* (1899) 281; *Cheesem. Man. N.Z. Fl.* (1906) 301; *Ill. N.Z. Fl.* i (1914) t. 93.

Var. **villosa** *Cheesem. Man. N.Z. Fl.* (1906) 302.—Leaves densely clothed on both surfaces with soft spreading glandular hairs. Mount Murchison, Buller Valley, *W. Townson!*

South Island: Nelson—Mountains near the Heaphy River, Diamond Lake, Mount Cobb, and generally not uncommon on the mountains of north-west Nelson, *F. G. Gibbs!* Mount Arthur and Mount Peel, *Spencer! T. F. C.;* mountains near Lake Guyon, *H. H. Travers!* Lake Tennyson, *R. M. Laing!* Mount Rochfort and Mount Frederic, and other mountains near Westport, *W. Townson!* Westland—Mountains near Greymouth, *Helms!* Mount Davy, *P. G. Morgan!* 3000–4500 ft. January–February.

This has a very different aspect from that of any other species, and can be recognized at a glance. The procumbent stems, which are almost woody at the base, the numerous ascending or suberect branches, and the small densely crowded linear-subulate leaves, incurved towards the tips of the branches, but spreading below, and which are green on both surfaces, are in combination a very striking set of characters.

2. **C. ramulosa** *Hook. f. Handb. N.Z. Fl.* (1867) 733.—Stems woody, procumbent, branched, 2–8 in. long; branches short, ascending or almost erect. Leaves numerous, densely imbricating, $\frac{1}{4}$–$\frac{1}{2}$ in. long, linear-oblong, obtuse, coriaceous, with broad membranous sheathing bases, glabrous above, clothed with soft white tomentum beneath; margins strongly revolute. Peduncles 1 or rarely 2 at the tips of the branches, short, slender, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, glandular-tomentose; bracts 1–3, small, narrow-linear. Heads $\frac{3}{4}$–1 in. diam.; involucral bracts linear-oblong, acute, glandular-pubescent. Rays spreading, narrow. Ripe achenes not seen.—*T. Kirk Students' Fl.* (1899) 281; *Cheesem. Man. N.Z. Fl.* (1906) 301.

South Island: Otago—Mount Pisa, *Petrie!* Mount Cardrona, *Goyen;* Mount Bonpland, *H. J. Matthews!* Mackinnon's Pass, *H. J. Matthews* and *F. G. Gibbs!* Eyre Mountains, *J. Speden! Poppelwell;* Cecil Peak, Old Man Range, *Cockayne!* mountains above Dusky Sound, *Hector* and *Buchanan! A. Reischek!* mountains near Lake Hauroko, *Thomson!*

A very distinct little plant, much smaller than the preceding, and with smaller appressed leaves which are white and cottony beneath, and show no signs of the peculiar lepidote scales of *C. Gibbsii.* Dr. Cockayne sends me a variety with the leaves patent and acute, collected on Mount Dick, near Kingston, Lake Wakatipu.

3. **C. Gibbsii** *Cheesem. Man. N.Z. Fl.* (1906) 300.—Stems slender, woody, sparingly branched, creeping and rooting at the base, erect or ascending above; branches few, short, leafy. Leaves numerous, laxly imbricating, spreading or reflexed from an appressed sheathing base, $\frac{1}{2}$–$\frac{3}{4}$ in. long, $\frac{1}{16}$–$\frac{1}{8}$ in. broad, linear-lanceolate, tapering from the base to a rather obtuse or subacute tip, coriaceous, somewhat rigid, green or glabrous above, beneath and on the sheaths sparsely covered with minute white lepidote scales; margins thick, revolute; midrib impressed above, much thickened and flattened beneath. Peduncles near the ends of the branches, solitary or more rarely 2 or 3, $1\frac{1}{2}$–$2\frac{1}{2}$ in. long, slender, sparsely glandular-lepidote; bracts 8–10, small, erect, linear-oblong, obtuse. Heads $\frac{3}{4}$ in.

diam.; involucral bracts linear-oblong, acute, more or less clothed with white glandular scales, inner with a tuft of cottony hairs at the tip. Ray-florets numerous, spreading. Achenes grooved, hispid.

South Island: Nelson—Mount Cobb (to the north of the Mount Arthur Plateau), Waingaro Peak, *F. G. Gibbs!* 3500–5000 ft. January–February.

An interesting plant, quite distinct from the other species of the section, and remarkable for the lepidote pubescence on the under-surface of the leaves, &c.

4. **C. rupestris** *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 409.—Stems long, much branched, stout and woody, prostrate, scrambling over rocks; branches ascending at the tips, densely clothed with closely imbricating leaves. Leaves numerous, crowded, ½–1 in. long, narrow linear-spathulate, obtuse, gradually narrowed to the base and then expanded into a broad membranous sheath, silky above, beneath clothed with soft white tomentum, suberect when young, patent or deflexed when old; margins strongly revolute. Peduncles 1 or 2 near the tips of the branches, 3–6 in. long, glandular-pubescent. Heads about 1 in. diam.; involucral bracts numerous, narrow-linear, pubescent and glandular. Ray-florets numerous, narrow, spreading. Achenes not seen.—*T. Kirk Students' Fl.* (1899) 281; *Cheesem. Man. N.Z. Fl.* (1906) 300.

South Island: Nelson—Mount Aorere, near Collingwood, *F. G. Gibbs!* high peaks flanking the Cobb Valley, *F. G. Gibbs!* ravines on Mount Peel, *T. F. C.* 3500–5000 ft. January–February.

Nearest to *C. Walkeri*, but distinguished by the smaller size, smaller narrower and more silky leaves with revolute margins, and by the smaller heads.

5. **C. Walkeri** *T. Kirk in Trans. N.Z. Inst.* ix (1877) 549, t. 30.—Stem stout, woody, much or sparingly branched, procumbent or suberect, 1–4 ft. long; branches spreading, densely leafy. Leaves very numerous, crowded, with broad imbricating sheathing bases wider than the blade, 1–1½ in. long; blade spreading, linear, acute, subcoriaceous, glabrous and somewhat viscid above, clothed with soft white tomentum beneath; margins flat, serrulate. Peduncles 1–3 near the tips of the branches, 4–8 in. long, slender, glandular-pubescent; bracts numerous, linear-subulate. Heads 1–1½ in. diam.; involucral bracts linear-subulate, pubescent and glandular, tips recurved. Ray-florets 30–40; ligule narrow, spreading. Achenes linear, silky, with 2–3 obscure ribs on each face.—*T. Kirk Students' Fl.* (1899) 280; *Cheesem. Man. N.Z. Fl.* (1906) 300.

South Island: Nelson—Mountains above Lake Tennyson, *R. M. Laing!* Canterbury—Mountains above Arthur's Pass, *T. F. C.* Westland—Kelly's Hill, *Petrie!* abundant in subalpine meadows and moist rocky places, *Cockayne!* Otago—Lake Wanaka, *Cockayne;* mountains near Lake Harris, *T. Kirk!* Mount Alta, *Buchanan!* Mount Aspiring, *Petrie!* Mount Earnslaw, *H. J. Matthews!* Eyre Mountains, *Poppelwell;* Humboldt Mountains, *J. Speden!* Mackinnon's Pass, *H. J. Matthews!* Lake Hauroko, *J. Crosby Smith.* 3000–5000 ft. December–February.

A very remarkable plant, easily recognized by the stout branching stem, densely clothed with imbricating leaves. Its only near ally is *C. rupestris.*

6. **C. densiflora** *Hook. f. Handb. N.Z. Fl.* (1864) 130.—Leaves 3–7 in. long, ¾–1½ in. broad, narrow linear-oblong, obtuse or subacute, subcoriaceous, glabrous above, clothed with soft white tomentum beneath except the prominent midrib; margins flat, crenate-dentate; sheathing petiole 1½–3½ in. long, membranous, glabrous or the margins slightly cottony. Scapes usually several, 6–18 in. long, stout or slender, glabrous, viscid; bracts few or many,

linear, 1–2 in. long. Heads 1–2 in. diam.; involucral bracts very numerous, in many series, linear-subulate, glabrous or pubescent, viscid; tips recurved. Rays long and narrow, twisted when withering. Achene narrow-linear, equalling the pappus, silky, strongly ribbed.—*T. Kirk Students' Fl.* (1899) 282; *Cheesem. Man. N.Z. Fl.* (1906) 303.

South Island: Canterbury—Mountains at the head of Lake Ohau, *Haast;* Mount Studholme, *C. Foweraker.* Otago—Mount Kurow, *Petrie! H. J. Matthews!* Mount Ida, *Petrie! H. J. Matthews!* Mount St. Bathan's, Mihiwaka, *Petrie!* Lake district, *Hector* and *Buchanan!* Blue Mountains, *H. J. Matthews!* 800–3000 ft. December–February.

Best recognized by the obtuse linear-oblong crenate-dentate leaves and numerous involucral bracts and florets. It has been recorded from the Tararua Range, in the North Island, but I have seen no specimens from thence.

7. **C. brevifolia** *Cockayne n. sp.*—Stems stout, woody at the base, much branched above, often forming large lax clumps; branches densely clothed with the remains of the old leaves. Leaves numerous, imbricated, upper erect, lower spreading or deflexed, ½–1½ in. long, ¼–⅓ in. broad, oblong or oblong-obovate, obtuse or subacute, gradually narrowed towards the base, and then suddenly expanded into a short and broad sheath, coriaceous, glabrous or nearly so above, glandular-viscid, beneath densely covered with soft white tomentum, midrib evident; margins remotely and minutely denticulate. Scapes 1 to several from the axils of the leaves near the tips of the branches, slender, viscid, 1½–3 in. long; bracts few, linear. Heads ¾–1 in. diam., involucral bracts narrow-linear, viscid, reflexed. Ray-florets numerous, linear, spreading, obtuse. Achene densely silky.

South Island: Canterbury—Mount Dobson Range, abundant, *T. F. C.;* Mount Ernest (head of Lake Wanaka), *Cockayne!* Mount Pisa, *Petrie! Cockayne!* Old Man Range, *Cockayne!* Two Thumb Range, *A. Wall!* 4500–6000 ft. January–March.

This appears to be quite a distinct species, easily recognized by its much-branched woody base, numerous closely set oblong leaves, which are small for the size of the plant, short scapes, and densely silky achenes. The Mount Dobson plant is larger than any specimens I have seen from Otago, and the leaves are larger, more acute, much more tomentose, and the tomentum is frequently, but not invariably, buff-coloured, not white.

8. **C. discolor** *Hook. f. Fl. Nov. Zel.* i (1853) 123.—Stems branched at the base, often forming broad flat-topped cushions. Leaves crowded, imbricated, obovate-spathulate to oblong-spathulate, ¾–1½ in. long, ⅓–½ in. broad, usually obtuse, gradually narrowed to the base, entire or obscurely dentate, coriaceous, brownish-green, viscid and glabrous above, beneath densely clothed with silvery-white tomentum, midrib usually evident. Scapes 1 or several, 3–5 in. long or more, slender, viscid; bracts several, linear. Heads ¾–1 in. diam.; bracts of the involucre short, linear, acute, tips recurved. Rays narrow, spreading. Achene silky.—*Handb. N.Z. Fl.* (1864) 131; *T. Kirk Students' Fl.* (1899) 283; *Cheesem. Man. N.Z. Fl.* (1906) 304.

South Island: Abundant in mountain districts throughout. Altitudinal range 2500–5000 ft. December–February.

C. discolor, as limited above, is much reduced in scope from the *C. discolor* of the Handbook and of the first edition of this work. The forms with long narrow leaves now constitute the species *C. novae-zealandiae* (*C. angustifolia* Cockayne). Those with long much-branched densely leafy stems and small linear-oblong leaves form Cockayne's *C. brevifolia;* while the states intermediate between *C. discolor* and *C. lanata* make up Petrie's *C. intermedia.* *C. discolor* as thus restricted is abundant and wide-spreading, and stretches through the whole length of the South Island.

9. **C. intermedia** *Petrie in Trans. N.Z. Inst.* xlv (1913) 267.—Stems short, branched at the base and more or less prostrate, ascending or erect above, clothed with the remains of the decaying leaves. Leaves numerous, crowded, ½–¾ in. long, ⅕–⅓ in. broad, obovate-spathulate to elliptic-oblong, suddenly contracted into a distinct petiole, and then expanded into a broad silvery appressed sheath; upper surface glabrous, more or less viscid, often covered with a thin pellicle of matted silvery hairs, beneath densely clothed with closely appressed whitish tomentum; margins minutely toothed, veins obscure. Scapes usually solitary near the ends of the branchlets, 2½–5 in. long, slender, sparingly tomentose; bracts numerous, short, linear-subulate. Heads ⅓–⅔ in. diam.; involucral bracts subulate-lanceolate, glandular-pubescent and viscid. Achenes linear, sparsely pubescent, slightly shorter than the pappus.—C. incana *var.* petiolata *T. Kirk Students' Fl.* (1899) 284; *Cheesem. Man. N.Z. Fl.* (1906) 305. (= C. discolor Hk. f. acc. to Cheesem.)

South Island: Nelson—Ben Nevis, *F. G. Gibbs!* Mount Arthur, *T. F. C.;* Mount Rochfort, *W. Townson!* Mount Frederic, *W. Townson! P. G. Morgan!* Mount Buckland, *Petrie!* Canterbury—Arthur's Pass, *T. F. C., Petrie!* Mount Arrowsmith, *Cockayne.* Westland—Mount Rolleston, *J. B. Armstrong!* Kelly's Hill, *Petrie!* 3000–5000 ft. December–February.

In the Manual I followed Mr. Kirk in treating this as a variety of *C. incana,* but I am now fully convinced of its specific distinctness.

10. **C. novae-zealandiae** (Buch.) *Cheesem. n. comb.*—Stems woody at the base and often much branched, forming dense tufts; branches usually clothed with the old persistent leaves. Leaves numerous, imbricated, linear or linear-spathulate, 1–2 in. long or more, ⅕–¼ in. broad, obtuse or subacute, gradually narrowed downwards and then suddenly expanded into a broad sheathing base, coriaceous, entire or remotely and minutely dentate, glabrous and viscid above, beneath densely clothed with silvery-white appressed tomentum, midrib usually more or less evident. Scapes slender, 1 or several to a branch, 3–6 in. long, viscid and glandular-pubescent; bracts usually several, linear-subulate. Heads ¾–1½ in. diam.; bracts of the involucre linear, acute, viscid and glandular, recurved at the tips; rays ½ in. long, narrow, obtuse. Achene silky.—C. discolor *Hook. f. Fl. Nov. Zel.* i (1853) 123; *Handb. N.Z. Fl.* (1864) 131 (*in part*). C. angustifolia *Cockayne in Trans. N.Z. Inst.* xlvii (1915) 114. Erigeron novae-zealandiae *Buch. in Trans. N.Z. Inst.* xvii (1885) 287, t. 15.

South Island: Nelson—Collingwood, *Buchanan;* mountains above the Upper Clarence Valley, *T. F. C.;* Spenser Mountains, *R. M. Laing!* Canterbury—Mount Torlesse and the lower Waimakariri basin, *Cockayne!* Black Range, *J. D. Enys* and *T. F. C.,* abundant; Mount Peel, *H. H. Allan!* Upper Godley, *R. M. Laing!* Mount Cook district, *T. F. C., Cockayne!* Otago—Ben Lomond, Garvie Mountains, Eyre Mountains, *J. Speden!* Mount Aspiring, *Petrie!* 3500–4500 ft. December–February.

This was included by Hooker in his conception of *C. discolor,* and in this view he was followed by Kirk and myself. But it differs from *C. discolor* in the much longer and narrower leaves, and was rightly separated as a species by Cockayne, under the name of *C. angustifolia.* But I think there can be no doubt that it is identical with Buchanan's *Erigeron novae-zealandiae* (Trans. N.Z. Inst. xvii (1885) 287, t. 15), although I cannot follow him in placing it in the genus *Erigeron.* His specific name, however, is by many years the oldest, and I therefore adopt it in this place.

11. **C. Sinclairii** *Hook. f. Handb. N.Z. Fl.* (1864) 132.—"Rhizome long, as thick as a quill. Leaves 1½–2 in. long, ⅓–⅔ in. broad, linear-oblong or obovate-spathulate, obtuse or acute, obscurely toothed, glabrous on

C. allanii Martin Trans. 65:1935:181
var canescens l.c. 182

both sides, or white below, membranous, contracted into membranous, glabrous, or hoary sheaths 1 in. long. Scape slender, nearly glabrous. Head 1–1¼ in. diam.; involucral scales subulate, squarrose, recurved, pilose; rays numerous, ⅓ in. long; pappus whitish, ⅙ in. Achene silky."

discolor. var β

"South Island: Dun Mountain, *Sinclair* (leaves white below); Tarndale, *Sinclair* (leaves glabrous on both surfaces). Leaves more membranous than usual in the genus. I have only three specimens."

I have reproduced Hooker's description of this, for although I have gathered in several localities what I believe comes within its limitations I do not feel at all sure, in the absence of authentic specimens, that the identifications are correct. The species must evidently be placed close to *C. discolor*, differing mainly in the larger size, larger and broader much more membranous leaves, and much larger heads. If my conception of the species is correct, it is not uncommon in mountain districts from Nelson to Foveaux Strait.

12. **C. Lindsayi** *Hook. f. Handb. N.Z. Fl.* (1864) 132. — Often forming large rounded masses. Stems stout, woody, prostrate; branches numerous, decumbent or suberect. Leaves numerous, crowded, 3–8 in. long, ½–1 in. broad, linear-oblong or lanceolate, obtuse or subacute, coriaceous, obscurely and remotely denticulate or quite entire, glabrous above, clothed with appressed white tomentum beneath, midrib evident; sheaths broad, glabrous, deeply grooved. Scapes usually numerous, 2–8 in. long, slender, flexuous, glabrous or pubescent above; bracts linear. Heads 1–2 in. diam.; involucral bracts linear, acuminate, glabrate or pubescent. Ray-florets 30–40, spreading, rather distant. Tube of the disc-florets somewhat thickened; anther-cells obtuse at the base. Achene linear, silky.—*Lindsay Contrib. N.Z. Bot.* (1868) 53, t. 3, f. 1; *Bot. Mag.* t. 7134; *T. Kirk Students' Fl.* (1899) 284; *Cheesem. Man. N.Z. Fl.* (1906) 305; *Cockayne Veg. N.Z.* (1921) t. 8, f. 13. Erigeron Bonplandii *Buch. in Trans. N.Z. Inst.* xix (1887) 213.

see Trans 38:1906:346.

South Island: Otago—Cliffs of the south-east coast, from the Clutha River to Waikawa, *Lindsay! Buchanan! Petrie! T. Kirk! Cockayne!* and others; Mount Bonpland, *Martin;* Lake Harris, *H. J. Matthews.* Southland—Mount Franklin, *J. Crosby Smith.* January–February.

A handsome plant, which forms huge masses on the faces of sea-cliffs. Mr. Kirk considered the inland localities to be based on some mistake; but, on the other hand, the late Mr. H. J. Matthews, whose knowledge of New Zealand plants in cultivation was unequalled, assured me that he could not trace any difference whatever between specimens brought from Lake Harris and others from the sea-coast near Nugget Point.

13. **C. incana** *Hook. f. Fl. Nov. Zel.* i (1853) 123, t. 34A.—Rhizome prostrate; branches short, stout, densely clothed with the old persistent leaves. Leaves numerous, crowded, 1–2½ in. long, ½–¾ in. broad, oblong-spathulate or obovate-spathulate, obtuse or subacute, coriaceous, entire or minutely serrulate, plaited or furrowed above, both surfaces or the lower alone thickly coated with lax snow-white soft tomentum; sheaths ½ as long as the blade, thin and membranous, grooved, glabrous or slightly cottony. Scapes 1–3, stout, 3–9 in. high, tomentose; bracts many, linear. Heads ¾–1½ in. diam.; involucral bracts subulate-lanceolate, acute or acuminate, glandular-pubescent and viscid; the outer often recurved. Rays numerous, spreading. Achene linear, silky, about equalling the pappus.—*Handb. N.Z. Fl.* (1864) 131; *T. Kirk Students' Fl.* (1899) 284; *Cheesem. Man. N.Z. Fl.* (1906) 304.

var nivalis Martin Trans 65:1935:183

c. bonplandii Nb at least of L. Wakatipu

NORTH ISLAND: Summit of Moehau (Cape Colville), *Adams!* Mount Hikurangi, *Colenso*, *Adams* and *Petrie!* Tongariro, Ngauruhoe, and Ruapehu, with other portions of the central volcanic plateau, *T. F. C.*, *Spencer! Cockayne*, and others; Ruahine Mountains, *Colenso*, *B. C. Aston!* Tararua Mountains, *Buchanan.* SOUTH ISLAND: Not uncommon on the mountains of Nelson, Marlborough, and Canterbury, rarer to the south. 2500–5000 ft. December–January.

A handsome plant, easily recognized by its broad plaited leaves clothed on both surfaces with snow-white tomentum; but small forms appear to pass into the following.

14. **C. Haastii** *Hook. f. Handb. N.Z. Fl.* (1864) 131.—Forming large patches. Rhizome creeping, putting up short erect branches. Leaves greenish-grey, 1½–3 in. long, ½–1 in. wide, broadly oblong to oblong-spathulate or narrow obovate-spathulate, obtuse or acute, narrowed towards the base, subcoriaceous, glabrous and usually longitudinally plaited above, beneath clothed with thin whitish tomentum; margins recurved, minutely denticulate; sheaths ⅓–½ as long as the blade, thin, membranous, glabrous. Scapes usually several, 2–6 in. long, stout, densely tomentose or almost glabrous; bracts many, linear, acute or rarely obtuse, tomentose. Heads 1–1½ in. diam; involucral bracts linear, acute or acuminate, membranous, softly tomentose or almost villous. Rays spreading. Achene linear, glabrous, longer than the pappus.—*T. Kirk Students' Fl.* (1899) 284; *Cheesem. Man. N.Z. Fl.* (1906) 305; *Ill. N.Z. Fl.* i (1914) t. 94.

var tomentosa S+T. Tk. 72:54. Locke, Pillar

SOUTH ISLAND: Not uncommon in the central and western portions of the Southern Alps, from the Spenser Mountains southwards. 3000–6000 ft. December–February.

Well marked by the greenish-grey foliage, stout usually tomentose scapes with numerous linear bracts, membranous involucral bracts, and glabrous achene.

15. **C. Poppelwellii** *Petrie in Trans. N.Z. Inst.* xlvii (1915) 50.—Stems rather stout, 4 in. high or thereabouts, giving off several horizontal or ascending branches. Leaves closely imbricating, ½–¾ in. long, ⅓ in. broad, linear-spathulate, rather coriaceous, acute or subacute; margins recurved, not toothed, suddenly expanded below the petiolar part into a broad glabrous strongly nerved sheath, above more or less plaited and covered with a thin pellicle of silvery-grey tomentum; below clothed with loose grey tomentum; midrib prominent, more or less glabrous. Scapes 1–3 to a branch, 3–5 in. long, slender, tomentose; bracts numerous, linear. Heads ¾–1 in. diam.; involucral bracts in 2–3 series, linear-subulate, viscid. Ray-florets numerous. Achene glabrous.

SOUTH ISLAND: Otago—Eyre Mountains, *Poppelwell!* Mount Cleughearn, *J. Crosby Smith.*

This appears to be a distinct and well-marked species; but I have only seen very fragmentary specimens. Mr. Petrie compares it with *C. Haastii*, but the branching stems and much smaller and narrower leaves do not show any close affinity with that plant.

16. **C. prorepens** *Petrie in Trans. N.Z. Inst.* xix (1887) 326.—Stems prostrate, much branched, often forming large patches, densely clothed with the remains of the old leaf-sheaths. Leaves numerous, crowded, green on both surfaces, 1½–3 in. long, ½–1 in. broad, linear-oblong to linear-obovate, acute or subacute, hardly coriaceous, longitudinally furrowed and wrinkled, viscid, glabrous on both surfaces or slightly cottony beneath, coarsely serrate, margins slightly recurved; sheathing petiole short, narrower than

the blade, viscid. Scapes few, 3–8 in. long, slender, viscid, glabrous or nearly so; bracts several, linear or lanceolate. Heads 1–2 in. diam.; involucral bracts subulate-lanceolate, viscid; inner slightly cottony, with scarious margins; outer shorter and broader, puberulous. Rays long, spreading. Achene silky.—*T. Kirk Students' Fl.* (1899) 283; *Cheesem. Man. N.Z. Fl.* (1906) 303.

South Island: Otago—Upper Waipori, Rock and Pillar Range, Old Man Range, *Petrie!* Hector Mountains, *W. Wilcox;* Garvie Mountains, *Poppelwell, J. Speden!* Kingston, Mount Ida, Flagstaff Hill (near Dunedin), *H. J. Matthews;* common on the mountains flanking Lake Wakatipu as far as Walter Peak, *Cockayne!* 2000–4500 ft. December–January.

A well-marked plant, at once recognized by the deeply wrinkled almost glabrous leaves, green on both surfaces.

17. **C. Cockayniana** *Petrie in Trans. N.Z. Inst.* xliv (1912) 182.—Leaves few, narrow obovate-spathulate, 2–4 in. long, $\frac{1}{2}$–$\frac{3}{4}$ in. broad, subacute, subcoriaceous, distantly and minutely denticulate, bluntly apiculate; upper surface dull-green when dry, glabrous, venation evident; undersurface densely clothed with closely appressed whitish tomentum; midrib evident, veins indistinct. Scapes 2–3 to each shoot, 6–8 in. high, densely clothed, as are the bracts and involucral scales, with glandular jointed hairs; bracts numerous, lanceolate or oblong-lanceolate, acute or subacute. Involucral bracts numerous, in several series; the inner longer and narrower, sparingly cottony above. Achenes linear, hispid and silky.

South Island: Marlborough—Mount Fyffe (seaward Kaikouras), *Cockayne!* 4000 ft. T. 71: 45.

I have only seen two specimens of this species, and have consequently reproduced the main features of Mr. Petrie's description. According to him, its affinities are chiefly with *C. hieracifolia* and *C. Sinclairii.* see Kirk St. Fl.: 285

18. **C. hieracifolia** *Hook. f. Fl. Nov. Zel.* i (1853) 124, t. 34B.—Stems short. Leaves 1–5 in. long, $\frac{1}{2}$–1 in. broad, obovate-oblong to linear-oblong, obtuse or acute, narrowed to the base, coriaceous, obtusely crenate or serrate, glabrous or slightly pubescent above, viscid, clothed with appressed buff or white tomentum beneath; sheathing petiole strongly grooved, short, broad, glabrous. Scapes 2–10 in. long, stout, viscid, usually densely glandular-pubescent; bracts 3–10, linear, pubescent. Heads $\frac{3}{4}$–$1\frac{1}{2}$ in. diam.; involucral bracts linear, acuminate, viscid and glandular-pubescent; inner often cottony, outer recurved at the tips. Rays rather long, numerous. Achene silky, ribbed, longer than the pappus.—*Handb. N.Z. Fl.* (1864) 131; *T. Kirk Students' Fl.* (1899) 283; *Cheesem. Man. N.Z. Fl.* (1906) 303; *Cockayne Veg. N.Z.* (1921) t. 52. see T. 71: 95.

Var. **oblonga** *T. Kirk l.c.*—Much smaller than the type. Leaves 1–$2\frac{1}{2}$ in. long, $\frac{1}{4}$–$\frac{1}{3}$ in. broad, linear-oblong. Scapes 1–3 in. high. Heads $\frac{1}{3}$–$\frac{3}{4}$ in. diam.

North Island: Tararua Mountains, Mount Holdsworth, *B. C. Aston!* Mount Hector, *Petrie! B. C. Aston!* South Island: Nelson—Dun Mountain Range, abundant, *Monro, Sinclair, T. F. C., F. G. Gibbs!* and others; Mount Peel, *T. F. C.* Marlborough—Mount Stokes, *T. Kirk! J. H. Macmahon!* Var. *oblonga:* Mount Alpha, Tararua Mountains, *B. C. Aston!* Mount Arthur and Mount Owen, *T. F. C.;* Mount Murchison, *W. Townson!* 3500–4500 ft. December–January.

Apparently somewhat local in its distribution. It is probably nearer to *C. Dallii* than any other, but it is not nearly so large, and does not possess the large leafy bracts of that species. Jacks Pass & Hollis Pass Trans. Rec. C.M. 8: 1935: 113

Tararua E.P. see Allan, Trans. 65: 230

19. **C. Dallii** *Buch. in Trans. N.Z. Inst.* xiv (1882) 355, t. 35.—Leaves numerous, all radical, spreading, 4–8 in. long, 1–2 in. broad, narrow obovate-oblong or obovate-lanceolate, obtuse or subacute or apiculate, narrowed to the base and then expanded into a broad grooved membranous sheathing petiole, coriaceous, glabrous above, clothed with appressed pale-buff tomentum beneath; margins flat, sharply minutely serrate. Scapes 1–6, 6–18 in. long, rather stout, glabrous; bracts usually numerous, large, 1–2 in. long, leafy, clothed with buff tomentum beneath, usually several are aggregated under the head, forming a spurious involucre. Heads large, $1\frac{1}{2}$–$2\frac{1}{2}$ in. diam.; involucral bracts in several series, narrow-linear; inner cottony, outer slightly tomentose, viscid. Rays numerous, rather narrow. Achene pilose.—*T. Kirk Students' Fl.* (1899) 282; *Cheesem. Man. N.Z. Fl.* (1906) 302.

T. 71. 95.

South Island: Nelson—Mountains at the head of the Aorere River, *Dall!* Mount Lockett and Mount Cobb, *F. G. Gibbs!* Mount Arthur Plateau, *Spencer! T. F. C.;* Mount Rochfort, Mount Frederic, and the Paparoa Mountains, *W. Townson! Spencer! P. G. Morgan!* 3000–5000 ft. December–February.

A handsome plant, closely allied to *C. holosericea*, but distinguished by the smaller size, more coriaceous leaves with buff, not white, tomentum, and especially by the large leafy bracts.

Raoul Ann. Sci nat. iii (2). 1844 119.

20. **C. holosericea** *Hook. f. Fl. Antarct.* i (1844) 36.—Leaves all radical, spreading, 6–12 in. long, $1\frac{1}{2}$–$2\frac{1}{2}$ in. broad, lanceolate, oblong-lanceolate or spathulate-lanceolate, acute or acuminate, narrowed to the base, thinly coriaceous, glabrous above, clothed with thin appressed white tomentum beneath, midrib and principal veins distinct on both surfaces; margins flat, distantly acutely serrate; petiole broadly sheathing, glabrous, smooth and shining, grooved. Scapes few, 1–2 ft. long, slender, glabrous; bracts usually several, 1–$1\frac{1}{2}$ in. long, linear, white beneath. Heads large, 2–3 in. diam. or more; involucral bracts in several series, sometimes 1 in. long; inner narrow-linear, glabrous, usually viscid; outer broader, lanceolate, tomentose on the back. Ray-florets very numerous, with long narrow ligules. Achene pilose.—*Fl. Nov. Zel.* i (1853) 121, t. 31; *Handb. N.Z. Fl.* (1864) 130; *T. Kirk Students' Fl.* (1899) 282; *Cheesem. Man. N.Z. Fl.* (1906) 302. Aster holosericeus *Forst. f. Prodr.* (1786) 56; *A. Rich. Fl. Nouv. Zel.* (1832) 248; *A. Cunn. Precur.* (1838) n. 438.

South Island: Otago—Almost confined to the sounds of the south-west coast or the mountains at their heads. Jackson's Bay, *Buchanan!* Clinton Saddle and mountains west of Lake Te Anau, *Petrie!* Milford Sound, *Sutherland!* Dusky Bay, *Forster, Hector* and *Buchanan!* Port Preservation, *Lyall;* Rockburn and Sylvan Lake, *H. J. Matthews;* Lake Hauroko, *J. Crosby Smith.* Sea-level to 4000 ft. December–January.

A noble species, with apparently a very limited distribution.

21. **C. Traversii** *Hook. f. Handb. N.Z. Fl.* (1864) 134.—Root stout, tapering. Leaves 6–16 in. long including the petiole, $1\frac{1}{2}$–$2\frac{1}{2}$ in. broad, oblong or oblong-lanceolate, subacute or obtuse, coriaceous, dark brownish-green and glabrous above except the silky midrib, under-surface and margins clothed with rich soft and thick velvety ferruginous tomentum; midrib beneath glabrous, dark-purple; petiole from $\frac{1}{2}$ to as long as the blade, purple; upper surface and sheaths with loose snow-white tomentum. Scapes stout, 8–20 in. long, densely clothed with ferruginous tomentum; bracts few or many, linear. Heads 1–2 in. diam.; bracts of the involucre

numerous, linear, clothed with ferruginous wool. Rays narrow, spreading. Achene glabrous.—*T. Kirk Students' Fl.* (1899) 283; *Cheesem. Man. N.Z. Fl.* (1906) 306; *Ill. N.Z. Fl.* i (1914) t. 95.

South Island: Nelson—Mount Arthur, Mount Peel, Raglan Mountains, *T. F. C.*; Discovery Peaks (Waiau Valley), *W. T. L. Travers*; mountains overlooking the Hanmer Plains and the Upper Clarence Valley, *T. F. C.*; Mount Captain and the Upper Waiau, *T. Kirk!* South Otago—End Peak, Lake Hauroko, *J. Crosby Smith.* 3500–5500 ft. December–January.

A magnificent species, remarkable for the bright ferruginous tomentum of the under-surface of the leaves, the purple midrib, and the snow-white tomentum of the leaves.

Two supposed hybrids collected by Mr. C. E. Christensen near Hanmer, one between *C. spectabilis* and *C. Traversii*, and the other a cross between *C. coriacea* and *C. Traversii*, have been described at length by Dr. Cockayne in Trans. N.Z. Inst. xlvii (1915) 115–16. I have not seen specimens, and consequently hesitate to express an opinion, but the descriptions given certainly seem to support Dr. Cockayne's conclusions. Students interested in the probable origin of species through hybridization should consult Dr. Cockayne's memoir.

22. **C. cordatifolia** *Buch. in Trans. N.Z. Inst.* xi (1879) 427, t. 18.—Leaves 2–9 in. long including the petiole, ½–2 in. broad; blade about ½ the length, ovate-oblong or oblong, obtuse or subacute, cordate at the base, coriaceous, entire, dull-green and glabrous above, plaited, beneath clothed with velvety ferruginous tomentum; petiole grooved, expanded into a broad sheath at the base, villous with brownish tomentum or almost glabrous, sometimes purplish. Scape 6–12 in. long, stout, clothed with ferruginous tomentum; bracts numerous, linear. Heads 1½–2 in. diam.; involucral bracts numerous, villous or almost glabrous. Rays narrow, ¾ in. long. Achene linear, glabrous, strongly ribbed, exceeding the pappus. —*Cheesem. Man. N.Z. Fl.* (1906) 306. C. petiolata *var.* cordatifolia *T. Kirk Students' Fl.* (1899) 286.

var. Brockiei Hamon Trans. 65: 1935: 182
var. similis

South Island: Nelson—Mount Starveall, *A. McKay! Bryant!* Mount Duppa, Mount Richmond, *J. H. Macmahon!* January.

In the "Students' Flora" Mr. Kirk reduced this to *C. petiolata*, but it differs from all the forms of that species in the broader coriaceous leaves cordate at the base, and in the dark ferruginous tomentum. In the texture of the leaves and their tomentum it approaches *C. Traversii*, but differs entirely in the cordate leaf-base, and in the petioles wanting the snow-white tomentum which is so characteristic a feature of that plant. The species appears to be a very local one, confined to the Dun Mountain Range.

23. **C. petiolata** *Hook. f. Handb. N.Z. Fl.* (1864) 134.—Leaves 4–14 in. long including the petiole, ¾–2 in. wide; blade about ½ the length, oblong to linear-oblong or oblong-lanceolate, subacute, membranous or coriaceous, entire, glabrous or silky above, beneath clothed with whitish appressed tomentum; midrib usually glabrous, purple, veins diverging; petiole purplish, grooved, more or less loosely tomentose, expanded at the base into a short sheath. Scapes usually several, 6–18 in. long, often purplish, tomentose or villous; bracts linear. Heads 1½–2½ in. diam.; involucral bracts linear-subulate, usually densely tomentose. Ray-florets numerous, with a ligule ½–¾ in. long. Achene glabrous or nearly so, strongly ribbed.—*T. Kirk Students' Fl.* (1899) 286; *Cheesem. Man. N.Z. Fl.* (1906) 307; *Ill. N.Z. Fl.* i (1914) t. 96; *Cockayne Veg. N.Z.* (1921) t. 47, f. 69.

4 Man

Var. **membranacea** (*T. Kirk*) *l.c.*—Leaves narrowed at both ends, acute, membranous, glabrous on both surfaces or nearly so. Scape glabrate or pubescent. Heads rather smaller, involucral bracts glabrate.—*Cheesem. Man. N.Z. Fl. l.c.*

C. praestans All. 76: 589.

SOUTH ISLAND: Not uncommon in the central and western portions of the Southern Alps, from Lake Tennyson southwards to the south-west of Otago. Var. *membranacea*: Clarence and Waiau Valleys, *W. T. L. Travers! T. Kirk!* Lake Tennyson, *R. M. Laing!* Lyell Mountains, *W. Townson!* 2000–4500 ft. December–January.

Best distinguished by the almost membranous narrow-oblong leaves, with purple midribs and long and slender purple petioles. A very conspicuous plant in the Mount Cook district.

(Kirk)

24. **C. rigida** *Cockayne in Bot. Survey Stewart Id.* (1909) 44.—Very close to *C. petiolata*, but stouter in all its parts, and more rigid and erect. Leaves oblong-lanceolate or ovate-lanceolate, 4–6 in. long or more, 1¼–1¾ in. broad, rigid, thick and coriaceous, not membranous; tomentum of under-surface usually ferruginous, rarely white; midrib greenish-white towards the top of the leaf, purplish near the base; sheath full purple, edged with lax white tomentum. Scape stout, glabrous or pubescent. Heads rather larger than *C. petiolata;* involucral bracts glabrate or sparingly tomentose. —C. petiolata *var.* rigida *T. Kirk Students' Fl.* (1899) 286; *Cheesem. Man. N.Z. Fl.* (1906) 307. Trans. 46: 230 & 45: 289

STEWART ISLAND: Cliffs to the south of Mason Bay, not common, *T. Kirk! Cockayne!* Ruggedy Mountains, both inland and near the sea, *Poppelwell.* Sea-level to 1000 ft.

Closely allied to *C. petiolata*, but Dr. Cockayne assures me that it is strikingly different in appearance, and that living plants of the two species growing side by side can be distinguished at a glance.

25. **C. Rutlandii** *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 329.—Leaves 3–12 in. long including the petiole, 1–2½ in. broad, oblong or oblong-lanceolate, acute or apiculate, narrowed into the petiole, coriaceous, glabrous above or the midrib slightly cottony, beneath clothed with appressed white satiny tomentum; margins entire or minutely denticulate, often revolute; petiole shorter than the blade or equalling it, broad, grooved, densely clothed with loose snow-white tomentum. Scapes several, exceeding the leaves, softly cottony; bracts narrow-linear, purplish, tomentose. Heads 1–1¾ in. diam.; involucral bracts linear, acuminate, erect, glabrate or the outer cottony. Ray-florets numerous. Achenes silky, strongly grooved. — *Students' Fl.* (1899) 286; *Cheesem. Man. N.Z. Fl.* (1906) 307.

SOUTH ISLAND: Marlborough—Mount Stokes, *T. Kirk! J. H. Macmahon!* December–January.

A handsome and distinct species, allied to *C. petiolata*, but differing in the loose snow-white tomentum of the sheaths, the satiny under-surface of the leaves, and the thin erect almost glabrous involucral bracts.

26. **C. spectabilis** *Hook. f. Fl. Antarct.* i (1844) 35.—Often forming large patches. Stems stout, with the leaf-sheaths 1–2 in. diam. Leaves very numerous, crowded, rosulate; blade 3–6 in. long, ¼–¾ in. broad, narrow linear-oblong, acute or obtuse, slightly narrowed towards the base, very thick and coriaceous, glabrous or with a thin pellicle of silvery hairs above, longitudinally furrowed, beneath clothed with densely matted pale-buff or white woolly tomentum; margins recurved, entire or minutely serrulate; sheaths usually equalling the blade, membranous, clothed on both surfaces with loose soft and silky snow-white tomentum. Scapes 1 or several, stout, much longer than the leaves, densely cottony; bracts numerous, linear.

C gracilis x spectabilis Trans 59: 130 Arthur's Pass.

Heads about 1½ in. diam.; involucral bracts narrow linear-subulate, woolly or rarely almost glabrate, outer recurved at the tips. Rays numerous, rather short. Achene glabrous.—*Fl. Nov. Zel.* i (1853) 122, t. 33; *Handb. N.Z. Fl.* (1864) 134; *T. Kirk Students' Fl.* (1899) 287; *Cheesem. Man. N.Z. Fl.* (1906) 308. C. ruahinensis *Col. in Trans. N.Z. Inst.* xxvii (1895) 388.

var. albomarginata Martin. Trans 65: 183

Var. **mollis** *Cheesem. n. var.*—Tomentum of under-surface of leaf not nearly so woolly, the hairs being straighter and more silky.—C. mollis *Cockayne in Trans. N.Z. Inst.* xxxi (1899) 423.

var. angustifolia Martin. l.c. 184.

North Island: Mountains of the interior, from Mount Hikurangi and Lake Taupo southwards, not uncommon. South Island: Abundant in mountain districts in Nelson, Marlborough, Canterbury, and Westland; rare in Otago. 500–4500 ft. *Puhaeretaiko.* December–January.

var. marginifera Allan 76: 592.

A very distinct and well-marked species, easily recognized by the short narrow rigid leaves, densely clothed beneath with pale-buff soft and matted not appressed woolly tomentum. Var. *mollis* is hardly sufficiently distinct to be separated as a species. Probably Dr. Cockayne is right in considering it to be a hybrid between *C. spectabilis* and *C. petiolata.*

27. **C. dubia** *Cheesem. Man. N.Z. Fl.* (1906) 308.—Forming large patches. Stems rather stout, ¼–½ in. diam. with the leaves on. Leaves 1½–3 in. long, ⅓–⅔ in. broad; blade oblong or linear-oblong or lanceolate, acute at both ends, coriaceous, glabrous and furrowed above, clothed with soft white tomentum beneath, midrib distinct beneath; margins usually recurved, entire or very obscurely serrulate; petiole equalling the blade or shorter than it, slender, expanded below into a broad membranous sheath. Scapes 1 or more, 3–8 in. long, rather slender, white with loose cottony tomentum; bracts 4–6, linear or linear-spathulate. Heads about ¾ in. diam.; involucral bracts numerous, linear or linear-lanceolate, acute, scarious, shining, sparingly cottony or almost glabrate. Rays numerous, spreading. Achene glabrous.

South Island: Nelson—Mount Rochfort, Mount Frederic, and other localities near Westport, *W. Townson!* Mount Davy, Paparoa Mountains, *P. G. Morgan!* 2000–3000 ft. January–March. T. 71: 95.

A puzzling plant, which seems nearer to *C. spectabilis* than to any other species, although very different in appearance. In some respects it approaches *C. parva,* which, however, is a much smaller and more slender plant, with an almost filiform and nearly glabrous scape, and with much smaller heads and hispid achenes.

28. **C. Armstrongii** *Petrie in Trans. N.Z. Inst.* xxvi (1894) 269.—Stems short, stout, with the leaf-sheaths sometimes as thick as the wrist, crowned with numerous radiating leaves. Leaves 6–18 in. long or more, ¼–¾ in. broad, linear-ensiform, gradually tapering from below the middle to the acute apex, slightly narrowed below, rigidly coriaceous, upper surface longitudinally ribbed and covered with a delicate silvery pellicle, beneath clothed with smooth and satiny appressed tomentum, except the very stout and prominent midrib; margins recurved when dry; sheaths long, broader than the blade, clothed with snow-white cottony tomentum. Scapes usually several, as long as or longer than the leaves, rather slender, white and cottony; bracts numerous, linear. Head 1–1½ in. diam.; involucral bracts linear-subulate, rather rigid, glabrous or cottony on the margins, tips recurved. Rays narrow. Achene linear, grooved, pubescent.—*T. Kirk Students' Fl.* (1899) 290; *Cheesem. Man. N.Z. Fl.* (1906) 311.

T. 59: 430.

South Island: Nelson—Heaphy River, *Dall!* abundant on the Brunner and Paparoa Mountains, *W. Townson!* Westland—Arthur's Pass, *J. B. Armstrong! T. Kirk! T. F. C., Cockayne!* Kelly's Hill, *Petrie!* Mount Wilberg, *Cockayne;* Mount Tuhua, *Cockayne;* Haast River and Makarora Valley, *Poppelwell.* 2500–5000 ft. December–January.

T. 71:96.

Distinguished from *C. Lyallii*, which is its nearest ally, by the broader perfectly straight leaves with a stout orange midrib and satiny appressed tomentum.

29. **C. Petriei** *Cheesem. Man. N.Z. Fl.* (1906) 311.—Apparently a stout tufted plant. Leaves 8–18 in. long or more, $\frac{1}{2}$–$\frac{3}{4}$ in. broad, dagger-shaped, narrowed into an acuminate rigid and almost pungent point, contracted just above the top of the sheath, strict, erect, rigidly coriaceous, above perfectly glabrous and when dry marked with a stout longitudinal ridge or plait on each side of the middle of the leaf, beneath clothed with silvery-white appressed satiny tomentum and with two grooves answering to the ridges of the upper surface; midrib not evident on either surface; margins conspicuously recurved towards the tip of the leaf, less so or almost flat elsewhere; sheaths $1\frac{1}{2}$–3 in. long, broader than the blade, deeply grooved, more or less covered with thin cottony tomentum. Scape 12–18 in. long, stout, densely cottony; bracts numerous, narrow-linear, the lower often 2–3 in. long. Head $1\frac{1}{2}$ in. diam. or more; involucral bracts subulate-lanceolate, acuminate, chaffy and rather rigid, glabrate or the outer somewhat cottony, often recurved. Achene hispid.

South Island: Nelson—Mount Cobb, *F. G. Gibbs!* Otago—Haast River and Makarora Valley, *Poppelwell;* Clinton Saddle and Mackinnon's Pass, *Petrie! F. G. Gibbs! H. J. Matthews!* Routeburn and Garvie Mountains, *Poppelwell;* Lake Hauroko, *J. Crosby Smith;* Takitimu Mountains, *A. Wall!* 3000–5000 ft. December–January.

A very remarkable plant. The straight dagger-shaped leaves, with their two longitudinal plaits and rigid acuminate points, are quite unlike those of any other species.

30. **C. Lyallii** *Hook. f. Handb. N.Z. Fl.* (1864) 133.—Stem short, stout, crowned with a dense tuft of crowded radiating leaves. Leaves 9–18 in. long or more, $\frac{1}{4}$–$\frac{1}{3}$ in. broad, narrow-ensiform, straight or slightly curved, gradually tapering from the base to the rigid almost pungent tip, rigidly coriaceous, glabrous and smooth and even above, beneath strongly grooved and clothed with thin appressed tomentum or almost glabrous; margins quite entire; sheaths broader than the blade, thin, grooved, clothed with snow-white tomentum. Scapes 1 or several, longer or shorter than the leaves, rather slender, white with cottony tomentum; bracts linear. Head 1–2 in. diam.; involucral bracts subulate-lanceolate, rigid, glabrate or the margins cottony, tips recurved. Rays rather short, narrow. Achene linear, hispidulous, longer than the pappus.—*T. Kirk Students' Fl.* (1899) 290; *Cheesem. Man. N.Z. Fl.* (1906) 312. See Trans. 65 274.

South Island: Abundant in mountain districts from the south of the Nelson Provincial District to Foveaux Strait, but most plentiful on the eastern side of the dividing-range. 1000–4500 ft. December–January.

One of the most distinct species of the genus, easily recognized by the narrow tapering rigid and coriaceous and almost pungent-pointed leaves.

31. **C. pseudo-Lyallii** *Cockayne in Trans. N.Z. Inst.* xlii (1910) 314.—In general characters closely allied to *C. Lyallii;* but the leaves are much less rigid, and are not drawn out into the almost pungent point of that

species. Upper surface grooved and plaited, dark-green (not yellowish-green). Under-surface densely clothed with white silky tomentum, which usually conceals both the veins and midrib.—C. Lyallii *var.* pseudo-Lyallii *Cheesem. Man. N.Z. Fl.* (1906) 312.

South Island: Canterbury—Drier mountains of the Waimakariri basin, abundant, *Cockayne! T. F. C.;* Mount Peel, *H. H. Allan! R. M. Laing!* 2500–4500 ft. December–January.

There is not much to separate this plant from *C. Lyallii*, but the appearance is somewhat distinct, and Dr. Cockayne, who has had ample opportunities of studying it, has always maintained it as a valid species. But he is now inclined to consider it a hybrid between *C. Lyallii* and *C. spectabilis.*

32. **C. viscosa** *Hook. f. Handb. N.Z. Fl.* (1864) 133.—More or less viscid in all its parts. Stem branched; branches short, stout, with the old sheaths 1–1½ in. diam. Leaves numerous, crowded, erect, 3–5 in. long, ¼ in. broad, linear, obtuse or acute, viscid, very thick and coriaceous, rigid, longitudinally grooved on both surfaces, glabrous or hoary above, beneath white or grey with appressed tomentum; sheaths about 1 in. long, broader than the blade, glabrous, brown. Scapes usually several, much longer than the leaves, 6–12 in. long, stout, pubescent and viscid; bracts numerous, linear. Head 1½ in. diam.; involucral bracts numerous, linear-subulate, densely woolly and tomentose, viscid. Rays short, spreading. Achene linear, silky.—*T. Kirk Students' Fl.* (1899) 290; *Cheesem. Man. N.Z. Fl.* (1906) 312; *Ill. N.Z. Fl.* i (1914) t. 97.

South Island: Not uncommon in dry alpine districts from eastern Nelson, Lake Tennyson, and eastern Canterbury southwards to eastern Otago and Foveaux Strait. 3500 ft.–6500 ft. December–February. T. 71: 196.

A very distinct plant, well marked by the short and narrow erect grooved and viscid leaves, with glabrous sheaths.

33. **C. Hookeri** *Cockayne in Trans. N.Z. Inst.* xlvii (1915) 115.—A large handsome species. Root stout, as thick as the thumb. Leaves 8–20 in. long or more including the petiole, 1½–3 in. broad, lanceolate to oblong-lanceolate or spathulate-lanceolate, acute, narrowed into the petiole, coriaceous, glabrous or slightly cottony above but with woolly margins, beneath clothed with soft white or buff tomentum, entire or very obscurely serrulate; petiole as long as the blade, narrow, broader and sheathing at the base, grooved, densely woolly or almost glabrous. Scapes longer than the leaves, densely woolly; bracts numerous, linear or linear-spathulate, tomentose, the lowest sometimes 4 in. long. Heads about 4 in. diam.; involucral bracts narrow-linear, densely and softly woolly. Ray-florets slender; tube of corolla of disc-florets thickened below. Achene linear, glabrous, hardly equalling the pappus.—C. verbascifolia *T. Kirk Students' Fl.* (1899) 285; *Cheesem. Man. N.Z. Fl.* (1906) 309 (*in part, but not of Hook. f. Fl. Nov. Zel.* i (1853) 121). T. 71: 196

South Island: North-east Otago—Waitaki Valley, Horse Ranges, Flag Swamp, Macrae's, *Petrie! T. Kirk!* Sea-level to 2000 ft. December–February.

In the first edition of this work I followed, with great doubt, Kirk's identification of Hooker's *C. verbascifolia* with the plant described above. But I have long ago satisfied myself that this view is erroneous, and that the true *C. verbascifolia* is identical with Chapman's *C. Brownii.* Dr. Cockayne has arrived at the same conclusion, and as the plant of eastern Otago thus required a name he has applied that of *C. Hookeri* to it.

34. **C. verbascifolia** *Hook. f. Fl. Nov. Zel.* i (1853) 121.—Leaves 6–10 in. long including the petiole, 1–2 in. broad, lanceolate or oblong-lanceolate, acute, gradually narrowed into the petiole, coriaceous, quite entire or very obscurely denticulate, glabrous or sparingly pubescent above, beneath clothed with rather thin white or greyish-white tomentum; petiole shorter than the blade, tomentose. Scapes 6–14 in. long or more, tomentose; bracts linear, obtuse, almost villous. Heads 1–2 in. diam.; involucral bracts linear-subulate, villous towards the tips. Rays numerous, narrow, spreading. Achene sparingly silky.—*Handb. N.Z. Fl.* (1864) 132. *C.* Brownii *F. R. Chapm. in Trans. N.Z. Inst.* xxii (1890) 444; *T. Kirk Students' Fl.* (1899) 285; *Cheesem. Man. N.Z. Fl.* (1906) 309; *Cockayne Veg. N.Z.* (1921) t. 47, f. 68.

South Island: Otago—Mountains above Lake Harris, *H. J. Matthews!* Clinton Valley, *Petrie!* Mackinnon's Pass, *F. G. Gibbs!* Mystery Pass, between Lake Manapouri and Smith Sound, *F. R. Chapman!* Humboldt Mountains, *Cockayne!* Milford Sound and Port Preservation, *Lyall* (Handbook). January–February.

I have no doubt that *C. Brownii* Chapman is identical with Hooker's *C. verbascifolia*, as stated under the previous species, which can always be distinguished by the much greater size, broader leaves, and much larger heads, which sometimes are 4 in. in diameter.

35. **C. Mackaui** *Raoul Choix* (1846) 19, t. 14.—Leaves 6–20 in. long, 2–4 in. broad, linear-lanceolate, acuminate, gradually narrowed to the base, quite entire, membranous, glabrous on both surfaces when mature or slightly cottony at the base, often rather glaucous beneath; petiole broad, grooved, sheathing at the base, usually cottony on the inner surface. Scapes 12–24 in. high, stout, glabrous or sparingly cottony; bracts numerous, lanceolate, acuminate, sheathing at the base. Heads about 2 in. diam.; involucral bracts numerous, ovate-lanceolate, acuminate, membranous, glabrous. Rays long and narrow. Disc-florets very numerous; corolla thickened at the base. Achene linear, glabrous, strongly ribbed.—*Hook. f. Fl. Nov. Zel.* i (1853) 122; *Handb. N.Z. Fl.* (1864) 133; *T. Kirk Students' Fl.* (1899) 287; *Cheesem. Man. N.Z. Fl.* (1906) 310. *C.* coriacea *Raoul Ann. Sci. Nat.* (1844) 119 (*non Hook. f.*).

South Island: Marlborough—Mount Fyffe, *H. B. Kirk* (leaves only). Canterbury—Rocky places in the vicinity of Akaroa, from sea-level to 2000 ft., *Raoul* and many others; Mount Herbert, *W. Gray!* January–February.

A very distinct species, remarkable for the long acuminate leaves green and glabrous on both surfaces, the large heads, and herbaceous acuminate involucral bracts.

36. **C. coriacea** *Hook. f. Fl. Antarct.* i (1844) 36.—Leaves 12–24 in. long or even more, 1–3 in. broad, lanceolate or linear-lanceolate to linear-oblong, acute, usually gradually narrowed towards the base, coriaceous, upper surface longitudinally furrowed or almost plicate and covered with a delicate silvery pellicle, beneath clothed with appressed white and silvery tomentum; margins entire or very obscurely serrulate; sheaths short and broad, grooved, densely clothed with soft cottony or woolly tomentum. Scapes stout, 15–36 in. high, densely woolly and cottony, occasionally branched, or rarely even corymbosely divided; bracts numerous, linear, erect, cottony. Heads 1½–3 in. diam. or more; involucral bracts numerous, linear-subulate, cottony or almost glabrous. Rays very numerous, spreading, 1½ in. long; tube of corolla more or less pubescent. Achene linear, compressed, grooved, pubescent.—*Fl. Nov. Zel.* i (1853) 121,

t. 32; *Handb. N.Z. Fl.* (1864) 132; *T. Kirk Students' Fl.* (1899) 287; *Cheesem. Man. N.Z. Fl.* (1906) 310; *Cockayne Veg. N.Z.* (1921) t. 51, f. 77. C. Martini *Buch. in Trans. N.Z. Inst.* xix (1887) 213. Aster coriaceus *Forst. f. Prodr.* (1786) 56; *A. Rich. Fl. Nouv. Zel.* (1832) 250; *A. Cunn. Precur.* (1838) n. 439.

Var. **stricta** *Cockayne in Trans. N.Z. Inst.* xlv (1913) 252.—Stems much branched. Leaves narrower and more rigid, much more silvery on the upper surface, gradually tapering into a long acute apex and downwards into the narrow petiole.—*Cockayne Veg. N.Z.* (1921) t. 81.

Var. **lanigera** *Cheesem.*—Leaves smaller, 6–8 in. long, 1½ in. broad, linear-lanceolate; leaves and scapes densely villous or woolly with long white hairs.—C. lanigera *Petrie in Trans. N.Z. Inst.* xlviii (1916) 187.

Var. **semicordata** *Cheesem.*—Leaves shorter and broader in proportion, oblong-lanceolate, abruptly narrowed into a subcordate base.—C. semicordata *Petrie in Trans. N.Z. Inst.* xlvi (1914) 33.

Var. **lancifolia** *Cheesem. n. var.*—Much smaller and more slender. Leaves smaller, 2–8 in. long, ⅓–1 in. broad, lanceolate, acute, subcoriaceous or almost flaccid. Scapes numerous. Heads 1–1½ in. diam.—C. flaccida *Cockayne in Trans. N.Z. Inst.* xxxi (1899) 422.

North Island: Reported from the Tararua Mountains by Buchanan, but I have seen no specimens from thence. South Island: Abundant throughout in mountain districts, especially in the central and western portions of the Southern Alps. Altitudinal range 1500–4500 ft. *Cotton-plant; Leather-plant.* December–February. Var. *stricta:* Takitimu Mountains, south-west Otago. Var. *lanigera:* South-west Otago—Garvie Mountains, *Poppelwell!* Takitimu Mountains, *J. Crosby-Smith!* Var. *semicordata:* North-west Nelson—Mount Rochfort, *W. Townson!* Mount Buckland and the Paparoa Mountains, *W. Townson! Petrie!* at sea-level at Charleston, *W. Townson! Petrie!* Canterbury—Mueller Glacier, Hooker Valley, and other localities in the Mount Cook district, abundant, *T. F. C.* Var. *lancifolia:* Nelson—Mount Peel, abundant; mountains flanking the Wairau Valley, Clarence Valley, *T. F. C.*; Mount Lyell, *W. Townson!* Canterbury—Arthur's Pass, *Cockayne! T. F. C.*

A truly noble plant, probably the finest species of the genus. In its most luxuriant state it has a short stout stem which with the old leaf-sheaths is sometimes as thick as the wrist, and is crowned with numerous spreading and erect lanceolate leaves, from among which arise one or several stout scapes, bearing heads sometimes more than 3 in. diam., with long and narrow rays. This passes by almost imperceptible gradations into smaller varieties with narrower often less coriaceous leaves and smaller heads, with shorter and proportionately broader rays. It is difficult to find distinguishing characters between some of these forms and *C. Monroi* and other species. Under the above arrangement I have, with great reluctance, reduced Mr. Petrie's *C. lanigera* and *C. semicordata* to the position of varieties. I do this on the ground that both are only separated from the ordinary state of the plant by somewhat inconstant characters of trivial importance; in the first instance by the greater development of the woolly covering of the leaves and scapes—always an inconstant character in *Celmisia*—and in the second by the slightly cordate leaf-base. In the Mount Cook district, where var. *semicordata* is plentiful, it is easy to see how little reliance can be placed on such a variable character.

Branched flowering scapes are occasionally seen in the wild state, and can easily be fixed by cultivation. Mr. Kirk has briefly characterized the following in his "Students' Flora": (1) *foliosa*, with crowded foliaceous bracts sometimes 6 in. long; (2) *corymbifera*, with branched scapes, the heads forming an open corymb; and (3) *ensata*, which has ensiform leaves 8–12 in. long and ½ in. wide, and an irregularly branched scape. This last state was originally collected by Mr. H. J. Matthews, near Lake Harris, south-west Otago.

37. **C. lanceolata** *Cockayne in Trans. N.Z. Inst.* xliv (1912) (*Proceedings*) 51.—Habit of *C. coriacea*. Leaves yellowish-green, 8–16 in. long, 1½–2 in. broad, linear-lanceolate or ensiform, rigid, erect, gradually tapering to an acute point, narrowed downwards into a broad densely tomentose and sometimes shaggy sheathing base, coriaceous, above longitudinally grooved and plaited, covered with a delicate pellucid silvery pellicle; margins

[x] C. Boweana Petrie Trans 44:182 Scaly La.

C. insignis Martin Trans 65:1935:182
.. .. var dura S+T. 73:169

strongly recurved; under-surface densely and smoothly covered with appressed silvery tomentum; midrib yellowish-orange above, prominent and almost glabrous beneath. Scape compressed or terete, 8–15 in. long, clothed with lax snow-white tomentum; bracts numerous, leaf-like, ¾–2 in. long. Head 1½–2 in. diam.; involucral bracts numerous, greenish-brown, ciliate or almost glabrate. Ray-florets very numerous, spreading, ¾ in. long. Achene minutely pubescent. See Trans. 73:170.

South Island: Southland—Summit of the Longwood Range, but not common, *I. Young! A. Reichel!* 3000–3500 ft. January–February.

This appears to be intermediate in its characters between *C. coriacea* and *C. Armstrongii*, differing from the first in the narrow stiff erect leaves, which have conspicuous yellowish midribs, and much recurved leaf-margins. The flower-heads, although not so large as those of *C. coriacea*, are frequently 2 in. diam. It will probably prove to be a hybrid between *C. coriacea* and *C. Armstrongii*.

38. **C. Monroi** *Hook. f. Handb. N.Z. Fl.* (1864) 133.—Variable in size. Leaves 6–22 in. long, ½–1½ in. broad; narrow linear-oblong or linear-lanceolate, gradually attenuated upwards into an acute point, strict and erect, coriaceous or subcoriaceous, longitudinally grooved and plaited above and covered with a delicate pellicle of silvery hairs, beneath clothed with appressed white tomentum, often wrinkled with parallel lines when dry; margins recurved; petiole and sheaths short or long, sometimes more than ½ the length of the entire leaf, densely clothed with snow-white tomentum. Scapes 1 or several; 8–16 in. long, stout, usually densely woolly and cottony; bracts very numerous, linear. Head large, 1–2 in. diam.; involucral bracts numerous, linear-subulate, usually more or less woolly and cottony. Rays numerous, ½–¾ in. long; tube of corolla glabrous. Achenes glabrous or hispidulous.—*Bot. Mag.* t. 7496; *T. Kirk Students' Fl.* (1899) 288 (*in part only*); *Cheesem. Man. N.Z. Fl.* (1906) 313; *Cockayne in Trans. N.Z. Inst.* xlviii (1916) 194.

* South Island: Marlborough—Upton Downs, Awatere, *Monro!* Upper Awatere Valley and Taylor's Mistake, *J. H. Macmahon!* in several localities in the Awatere Valley, *Cockayne!* vicinity of Cheviot, *H. J. Matthews!* locality not stated, *J. B. Armstrong!* December–January.

There has been much uncertainty as to the limits of this species, and several collectors have confused it with small forms of *C. coriacea*. In the first edition of this work I confined it to the plants included in Hooker's original description; but there is some force in Cockayne's suggestion to further limit the species to the Awatere plant, or practically to that originally discovered by Monro. After full consideration I have decided to adopt that view. This will exclude the Mount Cook plant, which Petrie has lately described as a distinct species under the name of *C. Boweana* (Trans. N.Z. Inst. xliv (1912) 182), but which is now regarded by Cockayne as probably of hybrid origin.

39. **C. Adamsii** *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 329.—Leaves 6–18 in. long including the sheaths, ½–1 in. broad, narrow linear-oblong or linear-lanceolate, acute or obtuse, narrowed into an evident petiole at the top of the sheath, membranous, glabrous above, beneath clothed with soft white tomentum except the evident midrib; margins minutely denticulate, flat or slightly recurved; sheaths thin and membranous, grooved, sparingly cottony or almost glabrous. Scapes equalling or exceeding the leaves, slender, sometimes flexuose, thinly clothed with cottony tomentum; bracts short, linear. Head 1–1½ in. diam.; involucral bracts subulate-lanceolate, acute, glabrous or cottony. Rays few, spreading. Achene glabrous.—*T. Kirk Students' Fl.* (1899) 288; *Cheesem. Man. N.Z. Fl.* (1906) 313.

* var robusta Martin Trans 65
" conspicua " " 1935:183

Var. **rugulosa** *Cheesem. Man. N.Z. Fl.* (1906) 313.—Shorter and stouter. Leaves more coriaceous, wrinkled above; sheaths more cottony. Scape stouter, densely cottony.

North Island: Auckland—Castle Rock, Coromandel, *T. F. C.*; Table Mountain (Whakairi) and other hills between the Thames and Tairua, *Adams! T. F. C.* Var. *rugulosa:* Mount Manaia and hills to the north of Whangarei Harbour, *T. Kirk! T. F. C.* December–January.

Most nearly allied to *C. major*, from which it is separated by the broader and flatter membranous leaves. Mr. Kirk placed my variety *rugulosa* under *C. Monroi*, from which it differs markedly in the much less rigid habit, spreading thinner leaves, shorter cauline bracts, nearly glabrous involucre, and fewer rays. It is much nearer to *C. Adamsii*.

40. **C. major** *Cheesem. n. sp.*—Rhizome stout, as thick as the finger, erect or inclined. Leaves very numerous and very closely packed, forming large dense clumps; spreading or curved, 4–15 in. long, $\frac{1}{4}$–$\frac{2}{3}$ in. broad, narrow-linear, gradually tapering upwards into an acuminate point and downwards into a thin and membranous sheath which is densely cottony along the margins; blade thick and coriaceous, glabrous above excepting a thin silvery pellicle, beneath covered with appressed silvery-white tomentum; margins more or less revolute. Scapes stout, numerous, erect, equalling or shorter than the leaves; bracts many, appressed to the scape, both bracts and scapes covered with snow-white cottony tomentum. Heads large, 1–1$\frac{1}{2}$ in. diam.; involucral scales more or less cottony. Ray-florets many. Achene linear, grooved, glabrous.—C. gracilenta *var.* b *Hook. f. Fl. Nov. Zel.* i (1853) 123. C. longifolia *vars.* major and asteliaefolia *T. Kirk Students' Fl.* (1899) 289; *Cheesem. Man. N.Z. Fl.* (1906) 314.

North Island: Auckland—Great Barrier Island, *T. Kirk!* cliffs north of the Manukau Harbour, *T. Kirk*, *T. F. C.* Taranaki—Mount Egmont Ranges, *Buchanan*, *T. F. C.* Sea-level to 4500 ft. December–February.

This is such a remarkably distinct plant that it is difficult to understand why Hooker should have associated it with either *C. gracilenta* or *C. graminifolia*, from both of which its stout spreading habit, thick coriaceous leaves, and large heads at once distinguish it.

41. **C. gracilenta** *Hook. f. Fl. Antarct.* i (1844) 35.—Stems usually densely tufted. Radical leaves numerous, 3–15 in. long, $\frac{1}{12}$–$\frac{1}{6}$ in. broad, very narrow-linear, strict and erect or softer and almost flaccid, subcoriaceous, convex above and obsoletely channelled about the middle, brownish-green and glabrous, or more or less covered with cobwebby tomentum when young; beneath clothed with silvery-white tomentum; margins strongly revolute, sometimes almost to the midrib; base of leaf dilated into a short and broad membranous sheath. Scapes usually several, shorter or longer than the leaves, slender, usually clothed with white cottony tomentum; bracts numerous, very narrow-linear. Heads $\frac{1}{2}$–$\frac{3}{4}$ in. diam.; involucral bracts narrow linear-subulate, glabrate or more or less cottony, often blackish at the tips. Achene narrow, glabrous.—*Fl. Nov. Zel.* i (1853) 122. C. longifolia *Hook. f. Handb. N.Z. Fl.* (1864) 134; *T. Kirk Students' Fl.* (1899) 289; *Cheesem. Man. N.Z. Fl.* (1906) 344 (*in part, not of Cassini*). Aster gracilentus *Banks and Solander MS.*

North and South Islands, Stewart Island: From the Thames Valley and the Waikato abundant throughout. Sea-level to 5000 ft. November–January.

This, the first species of *Celmisia* collected in New Zealand, was gathered by Banks and Solander in March, 1770, on the hills overlooking Admiralty Bay, a little to the west of Queen Charlotte Sound. Solander described his plant under the name of *Aster*

C. speden i Sinp Trans: 75:200 Garvie Mts.

gracilentus; but in 1844 Hooker, in a review of the then little-known genus *Celmisia*, transferred it thereto, using the same specific name. Working at the same genus in 1860 for the "Flora of Tasmania," and again in 1864 for the "Handbook of the New Zealand Flora," he decided to group *Celmisia gracilenta*, together with several allied species or varieties, under the original Australian species *C. longifolia* Cass. This view was followed by Bentham in the "Flora Australiensis," by T. Kirk in the "Students' Flora," and by myself in the first edition of this work. So the matter stood in 1906. Of later years much more attention has been given to *Celmisia*, and particularly to the bundle of forms included by Hooker in his conception of *C. longifolia*. Gradually it became evident that the differences between these forms were more important than had been generally admitted, and that several of them, at least, should be regarded as distinct species. Acting upon this conviction, in 1914 I separated my *Celmisia Morgani* from Kirk's variety *graminifolia*, and indicated that this variety also should be restored to the rank of a species. But this change evidently affects the supposed connection between the Australian *C. longifolia* and the New Zealand forms placed under it by Hooker. Through the kindness of Dr. Maiden I have been enabled to examine specimens of *C. longifolia* gathered on Mount Kosciusko, in the Australian Alps. Without going into details for which space is lacking here, I will simply state that there can be no question as to the distinctness of the Australian plant, which differs more from the New Zealand forms than most of our species do from one another.

C. gracilenta is best distinguished from its immediate allies by its very narrow-linear leaves, which are rounded and channelled above, and almost glabrous except when young; and by the strongly revolute margins, which sometimes almost reach the conspicuous midrib, and which are covered with white and silvery tomentum beneath. It has a wide range, and is particularly plentiful on the central volcanic plateau.

42. **C. graminifolia** *Hook. f. Fl. Antarct.* i (1844) 35.—Forming large grassy patches or separate tufts. Leaves 3–15 in. long including the petiolar part which is often quite ½ the length, ⅛–⅓ in. broad, thin and membranous or even flaccid; blade linear-elongate, gradually narrowed upwards into a long acuminate point and downwards into an exceedingly narrow petiole; upper surface nearly glabrous when mature except a silvery pellicle of matted hairs, but usually clothed with soft cottony tomentum when young; margins thinly revolute; under-surface densely clothed with thin appressed silvery tomentum; petiole greenish-grey or purplish-grey, usually expanded at the base into a broad thin and membranous sheath. Scapes several, usually longer than the leaves, slender, densely clothed with white cottony tomentum; bracts numerous, exceedingly narrow-linear, the upper gradually becoming smaller. Heads ¾–1 in. diam.; involucral bracts narrow linear-subulate, glabrous or slightly cottony. Ray-florets numerous, long and narrow. Achene linear, grooved, glabrous.—C. gracilenta *var.* d *Hook. f. Fl. Nov. Zel.* i (1853) 123. C. longifolia *var.* graminifolia *T. Kirk Students' Fl.* (1899) 289; *Cheesem. Man. N.Z. Fl.* (1906) 314. C. setacea *Col. in Trans. N.Z. Inst.* xxi (1889) 88. T. 72: 324.

North Island: Auckland—Bay of Islands, *Sinclair!* (*fide* Kew Herbarium); central volcanic plateau, *H. Hill.* Wellington—Mount Holdsworth, Tararua Range, *W. Townson!* South Island: Nelson—Mount Arthur Plateau, *T. F. C.;* Mount Lockett, *F. G. Gibbs!* Mount Rochfort, Mount Mantell, Mount Bovis, Boundary Peak, *W. Townson!* Lake Tennyson, *T. F. C.* Otago—Garvie Mountains, *J. Speden!* Sea-level to 4500 ft. December–January.

To my mind, this is readily distinguished from *C. gracilenta* by the grassy habit, much flatter thin and membranous leaves, with long petiolar stalks furnished with broad membranous sheathing bases, and by the very slender scapes. *C. major* is at once separated by the stouter habit, broader coriaceous spreading leaves, and much stouter scapes and larger heads. *C. Morgani* is its nearest ally, but can generally be recognized by its much larger size and broader leaves.

43. **C. Morgani** *Cheesem. in Trans. N.Z. Inst.* xlvi (1914) 21.—Leaves numerous, tufted, 6–20 in. long including the petiole, ½–1¼ in. wide; blade narrow linear-lanceolate, narrowed very gradually towards the base into an exceedingly slender petiole, above the middle tapering into an acuminate point, membranous, often almost flaccid, rarely subcoriaceous; upper surface glabrous or nearly so, usually smooth but sometimes furrowed when dry; under-surface clothed with thin white and silvery tomentum through which the veins are frequently visible; midrib evident beneath, often glabrous; petiole long and slender, greenish or greenish-purple, gradually expanded below into a thin and membranous cottony sheath sometimes ½ in. wide or even more. Scapes several, equalling or exceeding the leaves, very slender, usually more or less white and cottony but sometimes almost glabrous; bracts numerous, narrow-linear, the lowest sometimes 4 in. long, the upper gradually becoming smaller, the uppermost under ½ in. Heads ¾–1½ in. in diam.; involucral bracts linear-subulate, glabrous or cottony, green or purplish-green. Rays numerous, rather long and narrow. Achene linear, glabrous.

South Island: Nelson—Between Westport and the Ngakawau River, *P. G. Morgan!* near the mouth of the Ngakawau River, *Petrie!* December–February.

Closely related to *C. graminifolia* (*C. longifolia* var. *graminifolia* T. Kirk), but with much larger broader and thinner leaves, with remarkably slender petioles. I look upon it as quite a distinct species.

44. **C. alpina** *Cheesem. n. sp.*—Rhizome stout, woody, much branched; branches short. Leaves tufted at the tips of the branches, ½–2½ in. long, $\frac{1}{30}$–$\frac{1}{15}$ in. broad, very narrow-linear, apiculate at the tip, glabrous and canaliculate above, with revolute margins; beneath clothed with silvery-white appressed tomentum; midrib evident. Scapes solitary at the tips of the branches, 1½–3 in. long, strict, erect, cottony-white or nearly glabrous; bracts 2 or 3, linear-subulate. Heads large for the size of the plant, ½–¾ in. diam.; involucral bracts linear-lanceolate, acute, glabrate. Achene glabrous. —C. longifolia *var.* alpina *T. Kirk Students' Fl.* (1899) 289; *Cheesem. Man. N.Z. Fl.* (1906) 314.

South Island: Abundant in alpine bogs throughout. 3000 – 5000 ft. December–February.

A peculiar little plant, with a very distinct habit of growth, but possibly only an alpine variety of *C. gracilenta*.

45. **C. linearis** *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 337.—Stems branched at the base; branches short, stout. Leaves numerous, densely crowded, 1–5 in. long, $\frac{1}{6}$–$\frac{1}{5}$ in. broad, narrow-linear, acute, not pungent, coriaceous, longitudinally grooved and covered with a pellicle of silvery hairs above, clothed with white tomentum beneath; margins strongly recurved; sheaths from ⅓ to ½ the length of the blade, rather broad, thin and membranous, cottony on the back. Scape stout, variable in length, 1–10 in. high, cottony or tomentose; bracts few or many, linear-subulate with a broad sheathing base. Head 1 in. diam.; involucral bracts lanceolate-subulate, outer tomentose or cottony, inner nearly glabrous. Rays short. Achene silky.—*T. Kirk Students' Fl.* (1899) 289; *Cheesem. Man. N.Z. Fl.* (1906) 314.

South Island: Canterbury—*J. B. Armstrong* (locality not stated); Mount Cook district, *T. F. C.* Otago—Mount Maungatua, *Petrie!* Mackinnon's Pass, *H. J. Matthews!* Routeburn and the Garvie Mountains, *Poppelwell.* Stewart Island: Summit of

C. polyvenia S.+T. 72:34 Stewart Is. 75:201

Mount Anglem, Rakiahua, Taylor's Lookout, *T. Kirk!* Port Pegasus, *Thomson!* Fraser Peak, *Petrie!* Table Hill, *Cockayne!* Sea-level to 4000 ft. December–January.

An obscurely understood species. In the first place, it is exceedingly doubtful if Armstrong's name is rightly applied to the species described above, which his description by no means suits; and his remark that the species has been confused with *C. Monroi* is by no means applicable. Again, most of the Stewart Island specimens in my herbarium have longer and narrower leaves, with much more revolute margins, the tomentum is thinner and more appressed, and the scape is longer. Possibly more species than one are included under the description, but the material is not sufficient to prove this.

46. **C. laricifolia** *Hook. f. Fl. Nov. Zel.* ii (1857) 331.—Stems prostrate or decumbent, much branched at the base; branches 1–3 in. long, densely leafy. Leaves numerous, crowded, erect or recurved, $\frac{1}{3}$–1 in. long, $\frac{1}{20}$ in. broad, very narrow-linear or acerose, pungent, glabrous or slightly silky above, clothed with silvery tomentum beneath; margins strongly recurved; sheaths much broader than the blade, membranous, cottony or almost glabrous. Scape 2–4 in. long, very slender, glabrate or cottony; bracts few, very small. Head $\frac{1}{2}$ in. diam.; involucral bracts few, erect, linear-subulate, cottony. Rays few, short. Achene hispid.—*Handb. N.Z. Fl.* (1864) 135; *T. Kirk Students' Fl.* (1899) 289; *Cheesem. Man. N.Z. Fl.* (1906) 315.

South Island: Not uncommon in mountain districts throughout. 3000–6000 ft. December–January.

The small size and very narrow acerose leaves are excellent distinguishing characters.

47. **C. Hectori** *Hook. f. Handb. N.Z. Fl.* (1864) 135.—Stems prostrate, branched, often woody at the base; branches densely tufted. Leaves numerous, crowded, imbricate, $\frac{1}{2}$–1 in. long, $\frac{1}{6}$–$\frac{1}{4}$ in. broad, linear-spathluate or linear-obovate, obtuse or subacute, gradually narrowed below, coriaceous, silky or clothed with a silvery pellicle above, covered with appressed silky tomentum beneath; margins recurved; sheaths slightly expanded, cottony or nearly glabrous. Scapes stout, 2–4 in. long, tomentose and villous; bracts usually numerous, linear. Heads $\frac{3}{4}$–1 in. diam.; involucral bracts few, linear, acute, pubescent. Rays rather short, broad. Achene silky.—*T. Kirk Students' Fl.* (1899) 291; *Cheesem. Man. N.Z. Fl.* (1906) 315; *Ill. N.Z. Fl.* i (1914) t. 98.

North Island: Recorded from the Tararua Mountains by Mr. T. Kirk, but I have seen no specimens from thence. South Island: Canterbury—Mount Brewster, *Haast;* abundant in the Mount Cook district, *Dixon! T. F. C., Adams!* and others. Otago—Mount Alta, *Hector* and *Buchanan;* Hector Mountains, Humboldt Mountains, Mount Tyndale, The Remarkables, *Petrie!* Mount Earnslaw, Mackinnon's Pass, *H. J. Matthews! F. G. Gibbs!* Eyre Mountains and Garvie Mountains, *Poppelwell!* 4500–6500 ft. January–February.

Apparently a very distinct species, at once recognized by the small densely imbricated linear-obovate leaves and rather large heads.

48. **C. compacta** *Cheesem. n. sp.*—Stems prostrate and often woody at the base, much branched; branches closely compacted. Leaves very numerous, forming crowded rosettes at the tips of the branches, 1$\frac{1}{2}$–2 in. long including the sheathing petiole, $\frac{1}{5}$ in. broad; blade $\frac{1}{3}$–$\frac{1}{2}$ longer than the sheath, spreading, straight or curved, narrow subulate-lanceolate, tapering from the base to a subacute tip, convex on the back, thickly covered with spreading yellowish-buff tomentum; margins much recurved,

sometimes almost to the midrib, which is wholly covered with softer and paler more appressed tomentum. Sheaths broader than the blade, tightly appressed to the branch, thin and membranous, strongly grooved, glabrous except the margins, which are clothed with long whitish tomentum. Scape usually one to a rosette, 1½–2½ in. long, stout, densely clothed with buff tomentum; bracts few, linear. Heads 1–1½ in. diam.; involucral bracts few, linear-spathulate, acute, tomentose. Achene silky.

South Island: Nelson—Summit of Mount Arthur, 6000 ft., *T. F. C.* Canterbury—Crest of Mount Ollivier Range, Mount Cook district, in rocky places, not common, 6500–7000 ft., *T. F. C.*

Allied to *C. Hectori*, and closely approaching it in size and habit, but differing in the laxer yellowish-buff tomentum, linear-subulate leaves with tightly appressed sheaths, strongly revolute leaf-margins, and prominent midribs.

49. **C. Macmahoni** *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 327.—Tufted, forming small patches. Leaves numerous, crowded, rosulate, 1–1½ in. long including the sheath, linear-oblong, acute or subacute, thick and coriaceous, densely clothed on both surfaces with long white or buff silky hairs, 5–7-nerved beneath; margins flat; sheaths short, about as broad as the blade, glabrous above, with silky hairs beneath. Scapes stout, 3–5 in. long, densely villous with long silky hairs; bracts very numerous, narrow-linear. Head ¾–1 in. diam.; involucral bracts numerous, linear, acute or acuminate, outer villous, inner hispid with short brownish hairs. Rays short, broad. Achene hispid.—*Students' Fl.* (1899) 291; *Cheesem. Man. N.Z. Fl.* (1906) 316.

var. hadfieldii Martin

South Island: Marlborough—Mount Stokes, alt. 3800 ft., *J. H. Macmahon!* Nelson—Mount Richmond, alt. 4000 ft., *J. H. Macmahon!* January.

A beautiful little plant, apparently with a very restricted distribution, and widely different from any other species. I have seen no specimens except those gathered by Mr. Macmahon.

50. **C. parva** *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 328.—Small, densely tufted, seldom more than 2–3 in. high. Leaves numerous, spreading; blade ⅓–1 in. long, ⅛–¼ in. broad, linear-lanceolate to oblong-lanceolate or narrow-oblong, acute, narrowed into a rather slender petiole and then expanded into a membranous cottony sheath as long as the blade, subcoriaceous, glabrous and often reticulated above, beneath clothed with white appressed tomentum; midrib usually evident; margins flat or slightly revolute, distinctly denticulate. Scape 1½–3 in. high, very slender, glabrate or slightly cottony; bracts 2–3, small, narrow-linear, sheathing and dilated at the base. Head ½–⅔ in. diam.; involucral bracts linear-lanceolate, acute, scarious, often reddish at the tips, glabrate or the outer slightly pilose. Rays narrow. Achene hispid.—*Students' Fl.* (1899) 291; *Cheesem. Man. N.Z. Fl.* (1906) 316.

South Island: Nelson—Mountains at the Heaphy River, *Dall!* Mount Cobb, *F. G. Gibbs*; Mount Rochfort, *H. J. Matthews.* 3000–4000 ft. December–January.

A very curious little plant. Mr. Dall's specimens are all I have seen.

51. **C. sessiliflora** *Hook. f. Handb. N.Z. Fl.* (1864) 135.—Much branched at the base; each branch clothed with densely imbricating leaves, and forming a hard rosette 1–1½ in. diam., the rosettes usually compacted into

(6) var ambigua S+T. Trans 75:201 Wilmot Pass

broad flat patches 2–3 in. thick. Leaves very numerous, greenish-grey, most densely crowded, $\frac{1}{3}$–1 in. long, about $\frac{1}{12}$ in. broad, narrow-linear or linear-subulate, obtuse or subacute, strict, rigid and coriaceous, hoary or silky on both surfaces, flat above, convex on the back; sheath usually longer and broader than the blade, membranous, silky or villous. Head sunk among the leaves at the tip of the branch, very rarely exserted, $\frac{1}{2}$–1 in. diam.; involucral bracts few, linear-subulate, scarious, cottony or the inner glabrate. Rays few, narrow, spreading. Achene silky.—*T. Kirk Students' Fl.* (1899) 292; *Cheesem. Man. N.Z. Fl.* (1906) 316.

(a) var exigua Sub. Trans. N.Z. 75: 169

South Island: Abundant in mountain districts throughout. Stewart Island: Subalpine slopes on Mount Anglem and other localities, not common, *T. Kirk! Cockayne!* 2500–5500 ft. December–January.

One of the most distinct species of the genus, often forming extensive carpets in open places on the mountains, easily recognized from a distance by the peculiar greenish-grey colour. Mr. Kirk's var. *pedunculata* is a form in which the peduncle elongates after flowering.

52. **C. argentea** *T. Kirk Students' Fl.* (1899) 292.—Habit of *C. sessiliflora*, but more slender and much more branched; branches longer, 2–5 in., erect, $\frac{1}{4}$–$\frac{1}{2}$ in. diam. Leaves numerous, crowded, densely imbricated, $\frac{1}{4}$–$\frac{1}{2}$ in. long including the sheath, $\frac{1}{30}$ in. wide, linear-subulate, acute or subacute, coriaceous, flat or concave above, rounded on the back; sheaths longer and much broader than the blade, membranous, clothed with long silky hairs on the margins and back but often nearly glabrous in front. Head $\frac{1}{4}$–$\frac{1}{2}$ in. diam., deeply sunk among the leaves at the tip of the branch; involucral bracts few, linear, glabrate or slightly silky. Rays few, short. Achene silky.—*Cheesem. Man. N.Z. Fl.* (1906) 317; *Cockayne Veg. N.Z.* (1921) t. 53, f. 82. C. sessiliflora *var.* minor *Petrie in Trans. N.Z. Inst.* xv (1883) 359.

South Island: Otago—Clinton Valley, *Cockayne;* Garvie Mountains, *Poppelwell!* Lake Hauroko, *J. Crosby Smith;* summit of Maungatua, *Petrie! H. J. Matthews!* Stewart Island: Abundant on the mountains, and descending to sea-level at Port Pegasus. Sea-level to 3500 ft. December–January. See Trans. 75: 169

A remarkably handsome little plant.

53. **C. bellidioides** *Hook. f. Handb. N.Z. Fl.* (1864) 135.—Rootstock much branched, prostrate; branches numerous, much divided, creeping and rooting at the base, erect at the tips. Leaves usually close-set, spreading, $\frac{1}{4}$–$\frac{2}{3}$ in. long, $\frac{1}{8}$–$\frac{1}{6}$ in. broad, linear-oblong or linear-spathulate, obtuse, gradually narrowed into rather short cottony petioles, coriaceous, veinless, green and glabrous on both surfaces; margins flat, entire or obscurely toothed. Scapes from near the tips of the branches, slender, 1–2 in. long, glabrous or slightly cottony; bracts numerous, leafy. Head $\frac{3}{4}$ in. diam.; involucral bracts few, narrow linear-oblong, acute or subacute, green with usually purple margins, glabrous. Rays numerous, spreading. Achene densely silky.—*T. Kirk Students' Fl.* (1899) 292; *Cheesem. Man. N.Z. Fl.* (1906) 317.

South Island: Mountain districts from Nelson to the south of Otago, but often local. Usually on wet rocks or on shingle through which water flows. 2000–5000 ft. December–January.

A very distinct species, at once recognized by the glabrous branching habit, linear-spathulate green and almost fleshy leaves, and numerous leafy bracts.

C. clavata S+T. Trans 72: 35 Stewart Is.

54. **C. Thomsoni** *Cheesem. in Trans. N.Z. Inst.* xlviii (1916) 211.—Forming compact cushion-like patches 1–3 in. diam., rarely more. Root-stock short, much branched, prostrate; branches usually numerous, densely compacted, leafy above. Leaves numerous, closely imbricate and rosulate, $\frac{1}{3}$–$\frac{1}{2}$ in. long, $\frac{1}{8}$–$\frac{1}{5}$ in. broad, narrow obovate-oblong or almost linear-oblong, obtuse or bluntly apiculate, narrowed at the base, thickly coriaceous, dull-green, glabrous beneath, upper surface setulose with short stiff glandular hairs; margins furnished with minute irregular denticles; petioles short, broad, sheathing at the base. Scapes from near the tips of the branches, $1\frac{1}{2}$–$2\frac{3}{4}$ in. long, very slender, glabrous or more commonly sparsely glandular-tomentose above; bracts 2–4, narrow-linear. Heads $\frac{1}{2}$–$\frac{3}{4}$ in. diam.; involucral bracts few, narrow linear-oblong, acute, green or the outer ones purplish-green. Rays numerous, spreading. Achenes densely silky.

South Island: Otago—Eyre Mountains, in rock crevices in the faces of cliffs, 5000–6000 ft., *W. A. Thomson* and *J. Speden!*

Allied to *C. bellidioides*, but differing in several important characters. It is much smaller and much more compactly branched, thus having a tufted cushion-like habit quite different from the creeping and mat-like appearance of *C. bellidioides*. The leaves are decidedly rosulate, and the upper surface is sprinkled all over with short stiff glandular hairs. When fresh the leaves are dull-green, and thus quite unlike the bright shining green of *C. bellidioides*.

55. **C. glandulosa** *Hook. f. Fl. Nov. Zel.* i (1853) 124.—Stem rather stout, sending out creeping and rooting leafy stolons. Leaves few, rosulate, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, $\frac{1}{4}$–$\frac{1}{2}$ in. broad, ovate- or oblong-spathulate or obovate, acute or apiculate, narrowed into a winged petiole, acutely serrate or dentate, membranous, green on both surfaces, glabrous or more usually covered with minute glandular pubescence, veins reticulated; petioles expanded into a short sheath; margins often ciliate. Scape slender, 2–5 in. long, glandular-pubescent; bracts few, linear, acuminate. Head $\frac{1}{2}$–$\frac{3}{4}$ in. diam.; involucral bracts in 2–3 rows, linear-subulate, erect or the outer recurved, glandular-pubescent, often ciliate at the tips. Rays few or many, spreading. Achene silky.—*Handb. N.Z. Fl.* (1864) 135; *T. Kirk Students' Fl.* (1899) 293; *Cheesem. Man. N.Z. Fl.* (1906) 318; *Ill. N.Z. Fl.* i (1914) t. 99. C. membranacea *Col. in Trans. N.Z. Inst.* xxii (1890) 470.

Var. **latifolia** *Cockayne in Trans. N.Z. Inst.* xlix (1917) 57.—Leaves broadly oblong-spathulate, rounded at the top, narrowed at the base into a broad petiole, more or less glandular-pilose; margins ciliate. A very distinct variety.

Var. **longiscapa** *Cockayne l.c.* 58.—Leaves larger, 2–$2\frac{1}{2}$ in. long including the petiole, the latter often almost equalling the blade. Scape much longer, often 8–9 in. Otherwise very similar to the type.

North and South Islands: Open mountain districts from Tongariro and Ruapehu southwards to Foveaux Strait, not rare, usually in peaty swamps. 1500–4500 ft. December–January. Var. *latifolia:* Mount Egmont, *Cockayne! T. F. C.* Var. *longiscapa:* Upper Clinton Valley (Fiord County), *Cockayne!*

One of the most distinct species of the genus. It can be recognized at a glance by the absence of the woolly tomentum so commonly present in the other species, which in this instance is replaced by a short and fine glandular pubescence.

56. **C. glabrescens** *Petrie in Trans. N.Z. Inst.* xlvii (1915) 50.—Stems not numerous, tufted, decumbent at the base, erect above, sending out creeping and rooting leafy stolons. Leaves rosulate, 2–4 in. long including the

petiole, ½–¾ in. broad, narrow oblong-spathulate or elliptic-spathulate to obovate-spathulate, acute or apiculate, gradually narrowed into a linear petiole which expands at the base into a broad veined sheath, thin and membranous, green and glabrous above, beneath clothed with thin greyish-white tomentum. Midrib evident, veins obscurely reticulate; margins distantly and acutely minutely dentate. Scapes 3–4 in a tuft, tall and slender, 8–12 in. long, striate, glabrous or nearly so; bracts 4–6, ¾ in. long, narrow-linear. Heads rather large, 1¼–1½ in. diam.; involucral bracts usually in 3 series, linear-subulate, viscid; outer reflexed, inner erect. Achenes silky.

STEWART ISLAND: Meadows at Freshwater River, alt. 100 ft., *Poppelwell!*

A somewhat puzzling plant. On the whole, its affinities are nearest to *C. glandulosa*, of which it has the foliage with its peculiar dentate margins; but, on the other hand, the indumentum is altogether different.

57. **C. vernicosa** *Hook. f. Fl. Antarct.* i (1844) 34, tt. 26, 27.—Perfectly glabrous, leafy, densely tufted. Leaves very numerous, most densely crowded, rosulate, spreading, 1–4 in. long, ⅛–⅓ in. broad, linear, straight or curved, obtuse or subacute, in small specimens often knobbed at the tip, rigid and coriaceous, polished and shining, entire or obscurely toothed, flat or convex above, margins recurved, midrib prominent beneath; sheath short, broad. Scapes usually numerous, 1–9 in. high, rather stout, often flexuose, clothed with leafy coriaceous bracts. Heads 1–1½ in. diam.; involucral bracts linear, erect; margins often ciliate. Rays numerous, white, rather broad, spreading. Disc-florets purple; corolla-tube pilose. Achene hispid.—*Handb. N.Z. Fl.* (1864) 136; *T. Kirk Students' Fl.* (1899) 293; *Cheesem. Man. N.Z. Fl.* (1906) 318; *Subantarct. Is. N.Z.* ii (1909) 414.

AUCKLAND AND CAMPBELL ISLANDS: Abundant from sea-level to 1500 ft., usually on moist grassy places, *Hooker* and all subsequent collectors. November–December.

An exceedingly handsome plant, of which a beautiful plate is given in the "Flora Antarctica." It and the following species are the only ones with purple disc-florets.

58. **C. Campbellensis** *Chapm. in Trans. N.Z. Inst.* xxiii (1891) 407.—Leaves rosulate, 3–6 in. long, ½–¾ in. broad, lanceolate or obovate-lanceolate, obtuse or subacute, gradually narrowed to a short broad sheathing base, hardly coriaceous, glabrous above and longitudinally furrowed, sparingly tomentose and with prominent longitudinal ribs beneath; margins flat, finely and sharply serrate. Scapes 6–10 in. high, sparingly tomentose; bracts numerous, linear, sheathing at the base. Head 1½–2 in. diam.; involucral bracts linear, acute, glabrate or sparingly cottony, midrib evident. Rays spreading, white. Disc-florets purple; corolla-tube pilose. Achene hispid.—*Cheesem. Man. N.Z. Fl.* (1906) 318; *Subantarct. Is. N.Z.* ii (1909) 414. C. Chapmani *T. Kirk in Gard. Chron.* ix (1891) 731, f. 146; *Students' Fl.* (1899) 293.

AUCKLAND ISLANDS: Carnley Harbour, *Dorrien-Smith* and *Cockayne! J. S. Tennant!* CAMPBELL ISLAND: Venus Cove, Perseverance Harbour, *F. R. Chapman* and *T. Kirk!*

The flower-heads and scapes hardly seem to differ from those of *C. vernicosa*, but the leaves are altogether different, being broader and not so coriaceous, longitudinally furrowed above, and strongly ribbed beneath.

8. **VITTADINIA** A. Rich. 1832.

Branched perennial herbs or small undershrubs, usually woody at the base. Leaves alternate, entire or toothed or lobed. Heads rather small, solitary and terminating the branches or forming loose terminal corymbs. Involucre hemispherical or campanulate; bracts in few series, imbricate, narrow, acute; margins scarious. Receptacle pitted, without scales. Ray-florets all female, numerous, crowded, ligulate. Disc-florets hermaphrodite, tubular, dilated upwards, usually 5-lobed. Anthers obtuse at the base. Style-branches narrow, somewhat flattened, with subulate tips. Achenes usually narrow, compressed, with or without ribs. Pappus copious, of numerous unequal capillary bristles.

A small genus of 8 or 10 species, found in New Guinea, Australia, Tasmania, New Caledonia, and extra-tropical South America. The species from the Sandwich Islands formerly included by Asa Gray and other botanists in *Vittadinia* now constitute the endemic genus *Tetramolopium*.

1. **V. australis** *A. Rich. Fl. Nouv. Zel.* (1832) 251.—A small much-branched herb 4–12 in. high, hard and woody at the base; branches numerous, decumbent or suberect, usually more or less hispid-pubescent or glandular, rarely almost glabrous. Leaves $\frac{1}{4}$–$\frac{1}{2}$ in. long, obovate-spathulate to linear-cuneate, entire or 3–5-toothed or -lobed at the tip, narrowed into a broad flat petiole, hispid or pubescent. Heads solitary on short peduncles terminating the branches; involucral bracts few, in 2–3 series, linear-subulate, acute, erect, hispid or pubescent. Ray-florets in 1 series, usually exceeding the pappus, narrow, white, spreading. Disc-florets narrow, slender, longer than the involucre. Achene linear, compressed, obtuse at the tip, narrowed to the base, pubescent, usually with 5–8 striae on each face. Pappus exceeding the achene.—*A. Cunn. Precur.* (1838) n. 441; *Raoul Choix* (1846) 45; *Hook. f. Handb. N.Z. Fl.* (1864) 136; *Benth. Fl. Austral.* iii (1866) 420; *T. Kirk Students' Fl.* (1899) 294; *Cheesem. Man. N.Z. Fl.* (1906) 319. Eurybiopsis australis *Hook. f. Fl. Nov. Zel.* i (1853) 125.

North and South Islands: From the Great Barrier Island and Whangarei southwards, but local to the north of the East Cape. Sea-level to 3000 ft. November–January.

Also found in Australia and Tasmania, where it runs into numerous varieties, some of which differ widely from the type, and may prove to be distinct species. Of these var. *dissecta* (Benth. Fl. Austral. iii (1866) 491) has become naturalized near Nelson. It can be distinguished by the leaves being pinnatifid, with the segments again lobed, and by the purple ray-florets. Two other closely allied forms (var. *linearis* and var. *erecta* T. Kirk Students' Fl. (1899) 295), with linear or linear-spathulate leaves $\frac{3}{4}$–$1\frac{1}{2}$ in. long and purple rays, have established themselves in the interior of Otago and elsewhere in the South Island.

9. **HAASTIA** Hook. f. 1864

Densely or laxly tufted perennial herbs, often forming large rounded or amorphous masses in alpine localities; root stout, branched, often very long; branches hard and woody, altogether concealed by the persistent leaves. Heads large, solitary at the tips of the branches, sessile and sunk among the uppermost leaves. Involucre hemispherical or broadly campanulate; bracts in about 2 series, linear, with scarious tips, the inner usually narrower, almost glabrous, the outer broader, densely woolly. Receptacle flat, papillose. Outer florets numerous,

female, in 2 or several series; corolla very short, slender, narrow-tubular, minutely 5-toothed; style-branches long, far-exserted. Disc-florets numerous, hermaphrodite, funnel-shaped, 5-toothed; style-branches not so long. Achene linear-oblong, glabrous, subterete, smooth or obscurely grooved. Pappus-hairs of 1 series of numerous rather rigid bristles, thickened at the tips.

A very remarkable and distinct genus, confined to New Zealand.

Forming compact pulvinate masses. Leaves most densely imbricate, broadly obcuneate, crenulate at the tip	1. *H. pulvinaris.*
Laxly branched, rufous or fulvous. Leaves loosely imbricated, obovate-spathulate, sharply recurved. Heads $\frac{1}{2}$–$\frac{3}{4}$ in.	2. *H. recurva.*
Laxly branched, whitish or pale fulvous. Leaves loosely imbricated, oblong-obovate, flat, suberect. Heads $\frac{3}{4}$–$1\frac{1}{4}$ in.	3. *H. Sinclairii.*
Small, densely tufted, fulvous. Leaves densely imbricated, obovate-cuneate, clothed with long straight hairs	4. *H. Greenii.*

1. **H. pulvinaris** *Hook. f. Handb. N.Z. Fl.* (1864) 156.—Forming large rounded or amorphous cushion-like masses 3–6 ft. diam. or more. Root long, stout, branched. Branches numerous, densely compacted, with the persistent leaves $\frac{3}{4}$ in. diam. Leaves spreading, most closely imbricated, thickly clothed with pale fulvous wool, especially towards the tips, $\frac{1}{3}$–$\frac{1}{2}$ in. long, broadly obcuneate, gradually narrowed to a broad sessile base, membranous below, tip thickened and provided on the upper surface with numerous fleshy projections, giving it a crenulate appearance, 3-veined when the wool is removed, veins anastomosing above. Head $\frac{1}{3}$ in. diam.; involucral bracts in 1–2 series, narrow-linear, free. Achene linear-oblong, glabrous, not ribbed. Pappus-hairs free at the base.—*Hook. f. Ic. Plant.* (1867) t. 1003; *T. Kirk Students' Fl.* (1899) 295; *Cheesem. Man. N.Z. Fl.* (1906) 320; *Cockayne Veg. N.Z.* (1921) t. 48, f. 71.

Var. **minor** *R. M. Laing in Trans. N.Z. Inst.* xliv (1912) 67.—Smaller in all its parts. Pappus-hairs scabrid, not thickened above.

South Island: Nelson—Summit of Gordon's Knob, *T. F. C.;* mountains above the Wairau Gorge, *Sinclair, T. F. C.;* Discovery Peaks, *W. T. L. Travers;* Mount Captain, *T. Kirk! T. F. C.;* Lake Tennyson, *T. F. C., R. M. Laing.* Marlborough—Mount Mouatt, mountains above the Awatere Valley, *Sinclair, T. Kirk!* Kaikoura Mountains, plentiful, *Buchanan! T. Kirk! Cockayne,* and others. 4000–6500 ft. *Vegetable sheep.* December–January.

One of the most remarkable plants known. The branches are everywhere covered and altogether concealed by the densely imbricated woolly leaves, and are so closely compacted that it is impossible to thrust the finger in between. In fact, the whole plant has the appearance of a woolly cushion marked with mamillated projections corresponding to the tips of the branches. The flower-heads are sunk in the top of these projections, and are almost hidden by the woolly hairs of the leaves. For a detailed account of the vegetative organs of the plant, and its minute anatomy, reference should be made to a paper by Miss E. Low in the Trans. N.Z. Inst. xxxii (1900) 150.

2. **H. recurva** *Hook. f. Handb. N.Z. Fl.* (1864) 156.—Forming laxly branched masses 3–9 in. broad, everywhere covered with soft dense fulvous or rufous wool; branches spreading, open, with the leaves $\frac{1}{2}$–$\frac{3}{4}$ in. diam. Leaves laxly imbricating, $\frac{1}{2}$–$\frac{3}{4}$ in. long, obovate or obovate-spathulate, sharply recurved about the middle; the lower $\frac{1}{2}$ loosely sheathing the branch, thin and membranous, veined, clothed with long woolly hairs; the upper $\frac{1}{2}$ thicker, with the superior surface much puckered and wrinkled, with corresponding reticulations beneath, both surfaces covered

with densely compacted wool. Heads ½–¾ in. diam.; involucral bracts in 1 series, linear, erect, densely woolly on the outside, glabrous within. Achene glabrous, not ribbed. Pappus-hairs free or very obscurely connate at the base.—*T. Kirk Students' Fl.* (1899) 296; *Cheesem. Man. N.Z. Fl.* (1906) 321.

Var. **Wallii** *Cockayne in Trans. N.Z. Inst.* 1 (1918) 175.—Leaves and heads much smaller than the type, and woolly tomentum white or nearly so.

South Island: Nelson—Mount Peel, *T. F. C.*; Wairau Gorge, *Sinclair, T. F. C.*; Discovery Peaks, *W. T. L. Travers*; mountains above the Clarence Valley, *T. F. C.*; Mount Percival, *Cockayne.* Marlborough—Kaikoura Mountains, *Buchanan!* Canterbury—Mount Torlesse, and mountains of the Broken River basin, *Haast, J. D. Enys! Petrie! Cockayne, T. F. C.*; Mount White, *J. B. Armstrong!* Usually on dry shingly slopes. 4000–6500 ft. December–January.

Easily distinguished from the other species of the genus by the conspicuously recurved leaves and their rufous or fulvous colour.

3. **H. Sinclairii** *Hook. f. Handb. N.Z. Fl.* (1864) 156.—Loosely tufted, much or sparingly branched, often simple. Branches decumbent or suberect, 3–9 in. long. Leaves erect or rarely spreading, laxly imbricating, ½–¾ in. long, oblong-obovate or rounded-obovate, flat, everywhere densely clothed with white or pale fulvous wool, thin and membranous towards the base, 5–7-veined when the wool is removed, upper portion thicker and slightly rugose. Heads large, ¾–1¼ in. diam.; involucral bracts in 2 series, with scarious tips, linear or linear-obovate, outer densely woolly, the inner nearly glabrous. Achene linear-oblong, smooth and glabrous, not ribbed. Pappus-hairs free to the base.—*Ic. Plant.* (1867) t. 1003; *T. Kirk Students' Fl.* (1899) 296; *Cheesem. Man. N.Z. Fl.* (1906) 321; *Ill. N.Z. Fl.* i (1914) t. 100. H. montana *Buch. in Trans. N.Z. Inst.* xix (1887) 215. Trans: 50: 175.

South Island: Not uncommon on dry shingle-slopes in alpine localities from the northern portions of the Mount Arthur Range, Nelson, southwards through the Canterbury Alps to the south-west of Otago. 4000–6500 ft. December–January.

Allied to *H. recurva*, but easily separable by the less-branched habit, paler wool, flat leaves, and larger heads. Dr. Cockayne sends me a series of specimens showing the species varies considerably in the size of the heads and in the amount of wool on the leaves.

Rec. Cant. Mus. 1924 2: 235.

4. **H. Greenii** *Hook. f. ex T. Kirk Students' Fl.* (1899) 296.—"Densely tufted, about 2 in. high; stems with the leaves ⅓ in. diam. Leaves densely imbricating all round the stem, ⅕ in. long, obovate-cuneate, rounded at the tip, thickly clothed on both surfaces with long straight hairs which meet beyond the margin and completely hide the leaves. Flowers unknown."—*Cheesem. Man. N.Z. Fl.* (1906) 321. = R. exiqua ?

See Cockayne's letters. Rec. C.M. 2: 1935. 235-239

South Island: Canterbury—Mount Cook, alt. 6500 ft., *W. S. Green.*

This is quite unknown to me, and in the absence of additional information I have reproduced Mr. Kirk's description. It was discovered during the Rev. W. S. Green's adventurous ascent of Mount Cook, and has not since been met with.

10. **GNAPHALIUM** Linn. 1737

Hoary or woolly annual or perennial herbs. Leaves alternate, quite entire. Heads rather small, corymbose or fascicled or solitary, heterogamous and discoid. Involucre ovoid or campanulate; bracts imbricate in several series, more or less scarious, the inner sometimes with white spreading tips. Receptacle naked or pitted. Florets of the circumference all

female, in 2 or more rows, numerous, filiform, minutely 3–4-toothed. Disc-florets hermaphrodite, fewer in number, tubular with a funnel-shaped 5-toothed mouth. Anthers sagittate at the base, produced into fine tails. Style-branches of the disc-florets nearly terete, truncate or capitate. Achenes oblong or obovoid, not ribbed. Pappus-hairs in 1 series, slender or thickened at the tip, caducous, often connate at the base.

A large genus, spread over the whole world, hardly distinguishable from *Helichrysum* and others except by the more numerous female flowers. Of the New Zealand species two are widely distributed in many countries, two others extend to Australia, the remainder are endemic.

A. Inner involucral bracts white and radiating. Heads corymbose.

Stems robust. Leaves 2–4 in. × ¼–¾ in., oblong-lanceolate, 3-nerved beneath. Heads ½ in. diam. .. .. 1. *G. Lyallii.*

Stems slender, prostrate or decumbent. Leaves ½–1 in., obovate-spathulate, faintly 3-nerved above. Heads ½–⅔ in. diam. .. 2. *G. trinerve.*

Stems slender. Leaves ½–2½ in. × ⅛–½ in., linear-lanceolate. Heads ⅓ in. diam. .. .. 3. *G. Keriense.*

Stems branched, slender, rigid. Leaves ½–1¼ in. × $\frac{1}{40}$–$\frac{1}{20}$ in., narrow-linear, margins recurved. Heads ⅓ in. .. .. 4. *G. subrigidum.*

B. Inner involucral bracts not white and radiating.

* Heads solitary, terminal.

Small, 1–4 in. high, simple or branched below. Leaves ⅓–2 in., linear-obovate, white on both surfaces. Head ⅓ in. diam. .. 5. *G. Traversii.*

Small, 1–2 in. high, solitary or tufted. Leaves ⅓–1 in., linear-spathulate, white beneath. Heads ⅕ in. diam. .. .. 6. *G. paludosum.*

Small, stems short, tufted. Leaves imbricate, ⅓ in., linear, silky on both surfaces. Head ½ in. diam. .. .. 7. *G. nitidulum.*

** Heads numerous, corymbose, ebracteate.

Stems 3–18 in. Leaves 1–3 in., linear or linear-spathulate, white and woolly on both surfaces .. .. 8. *G. luteo-album.*

*** Heads compacted into a dense glomerule, with linear bracts at the base.

Annual, stems 6–20 in., branched, erect, leafy. Glomerules ½–1 in. diam. .. .. 9. *G. japonicum.*

Perennial, with creeping stolons. Stems 3–12 in., simple. Leaves mostly radical. Glomerules smaller .. .. 10. *G. collinum.*

1. **G. Lyallii** *Hook. f. Fl. Nov. Zel.* i (1853) 137.—Stems 1–2 ft. high, stout, branched, decumbent or prostrate at the woody base, then erect, cottony above. Leaves close-set or the upper remote, spreading, 2–4 in. long, ¼–¾ in. broad, narrow oblong-lanceolate or narrow obovate-lanceolate, acute, gradually narrowed to a sessile base, membranous, glabrous above, beneath clothed with thinly appressed white tomentum and distinctly 3-nerved. Heads rather large, ½ in. diam., disposed in many-flowered terminal corymbs 2–4 in. across; pedicels cottony. Involucral bracts numerous, scarious, white, radiating, with short woolly claws. Female florets very numerous, disc-florets much fewer. Achene linear-oblong, smooth, glabrous. Pappus-hairs few, very slender.—*Handb. N.Z. Fl.* (1864) 152; *T. Kirk Students' Fl.* (1899) 297; *Cheesem. Man. N.Z. Fl.* (1906) 323. G. adhaerens *Col. in Trans. N.Z. Inst.* xvii (1885) 244.

North Island: Taranaki—Sea-coast at Opunake, *T. Kirk;* and at Manaia, *Mrs. F. Mason!* Waingongora, *Cockayne.* Wellington—Murimotu and Moawhango, *Petrie!* Ruahine Mountains, *Colenso! Andrew, Howlett!* Rimutaka Ranges, *T. Kirk!* South Island: Not uncommon along the western side from Collingwood to the Otira Gorge and southwards to Milford Sound. Sea-level to 2500 ft. November–January. Kaikaia Gorge, Mt Peak Trans 53 : 1926 70

A handsome plant, in its usual state at once recognized by the large size, broad distinctly 3-nerved leaves, and large heads. But small states with narrower leaves and smaller heads are difficult to separate from *G. Keriense*, and there is little doubt that the two species pass into one another. In both *G. Lyallii* and *G. Keriense* the disc-florets are frequently sterile, showing a tendency in the heads to become unisexual.

2. **G. trinerve** *Forst. f. Prodr.* (1786) 55.—Stems 1–2 ft. long, rather slender, sparingly branched, prostrate or decumbent, glabrate below, more or less white and cottony above. Leaves distant, spreading or deflexed, ½–1 in. long, obovate-lanceolate or spathulate, broadest towards the tip, acute or apiculate, gradually narrowed to a broad base, glabrous above and faintly 3-nerved, white with appressed wool beneath. Heads in corymbs of 3 to 10 or solitary, terminating the branches, which are produced into slender cottony bracteate peduncles, ½–¾ in. diam. Involucral bracts numerous, white, radiating, the outer woolly at the base. Achene linear-oblong, glabrous. Pappus-hairs few, slender.—*A. Rich. Fl. Nouv. Zel.* (1832) 339; *A. Cunn. Precur.* (1838) n. 455; *Raoul Choix* (1846) 45; *Hook. f. Fl. Nov. Zel.* i (1853) 138; *Handb. N.Z. Fl.* (1864) 153; *T. Kirk Students' Fl.* (1899) 297; *Cheesem. Man. N.Z. Fl.* (1906) 323.

North Island: Rimutaka Range, *T. Kirk!* South Island: West coast of Nelson to Westland and Milford Sound, south and east coasts of Otago, abundant. Stewart Island: Abundant on banks near the sea. Sea-level to 2500 ft. November–January.

Closely allied to the preceding, but sufficiently characterized by the more slender stems, shorter obovate-spathulate leaves, which are seldom 3-nerved beneath, and by the bracteate peduncles.

3. **G. Keriense** *A. Cunn. Precur.* (1838) n. 454.—Stems short or long, prostrate or decumbent, with numerous erect or ascending leafy branches 3–9 in. long, cottony above. Leaves spreading, ½–2½ in. long, ⅛–½ in. broad, narrow linear-lanceolate to oblong-lanceolate or spathulate-lanceolate, acute, gradually narrowed to the base, glabrous above, beneath white with appressed cottony tomentum but with the midrib evident, rarely faintly 3-nerved. Heads small, ⅓ in. diam., in many-flowered corymbs terminating the branches, which are produced into leafy or bracteate cottony peduncles. Involucral bracts numerous, white, radiating; outer cottony at the base. Achene minute, glabrous. Pappus-hairs few, very slender.—*Raoul Choix* (1846) 45; *Hook. f. Fl. Nov. Zel.* i (1853) 138; *Handb. N.Z. Fl.* (1864) 153; *T. Kirk Students' Fl.* (1899) 298; *Cheesem. Man. N.Z. Fl.* (1906) 323. G. novae-zealandiae *Sch. Bip. in Bot. Zeit.* iii (1845) 171. Helichrysum micranthum *A. Cunn. ex DC. Prodr.* vi (1837) 189.

North Island: Abundant by the sides of streams, &c., from Mangonui to Cook Strait. South Island: Along the western side of the Nelson Provincial District from Collingwood and Wangapeka southwards, but exact southern limit not certain. Sea-level to 3500 ft. October–December.

4. **G. subrigidum** *Col. in Trans. N.Z. Inst.* xvii (1885) 245.—Stems usually much branched, sometimes almost bushy, erect or decumbent at the base, woody, 9–20 in. long; branches slender, brittle, somewhat rigid, glabrous or cottony at the tips. Leaves close-set, spreading, ½–1¼ in. long, $\frac{1}{40}$–$\frac{1}{15}$ in. broad, very narrow-linear or narrow linear-spathulate, acute or apiculate, stiff and coriaceous, glabrous above, white with appressed tomentum beneath, but with the midrib evident; margins recurved. Heads

very numerous, ⅓–½ in. diam., in broad many-flowered corymbs at the ends of the branches; pedicels usually very slender, almost capillary, white and cottony. Involucral bracts white and radiating. Achene and pappus as in *G. Keriense.*—*Cheesem. Man. N.Z. Fl.* (1906) 324; *Ill. N.Z. Fl.* i (1914) t. 101. G. Keriense *var.* linifolia *Hook. f. Fl. Nov. Zel.* i (1853) 138; *Handb. N.Z. Fl.* (1864) 153; *T. Kirk Students' Fl.* (1899) 298.

North Island: Dry rocky places from the East Cape and Lake Taupo southwards, not uncommon. South Island: Giles's Creek, near Westport, *W. Townson!* Sea-level to 2000 ft. October–December.

This has generally been treated as a variety of *G. Keriense*, from which it differs in the more rigid erect and bushy habit, much narrower stiff and coriaceous leaves with recurved margins, and almost capillary pedicels. It deviates quite as much from *G. Keriense* as *Lyallii* and *trinerve* do, and for the sake of consistency should be considered as distinct, unless the four species are merged into one.

5. **G. Traversii** *Hook. f. Handb. N.Z. Fl.* (1864) 154.—A dwarf tufted perennial herb 1–4 in. high, simple or branched below, sometimes forming small patches. Leaves radical, petiolate, ⅓–2 in. long, linear-spathulate or linear-obovate, clothed on both surfaces with soft cottony wool, petiole long or short. Scapes erect, variable in length, ½–3 in., white with cottony wool; bracts 1–3, linear. Head solitary, terminal, ⅓ in. diam.; involucral bracts in about 3 series, erect, linear, obtuse, pale brownish-yellow, scarious and hyaline, shining; outer shorter and broader, cottony at the base. Female florets very numerous, with a few hermaphrodite ones in the centre. Achene puberulous or glabrous. Pappus-hairs copious, very fine, connate at the base.—*Benth. Fl. Austral.* iii (1866) 655; *T. Kirk Students' Fl.* (1899) 299; *Cheesem. Man. N.Z. Fl.* (1906) 324.

Var. **Mackayi** *T. Kirk l.c.*—Much branched, densely tufted, forming close matted patches. Leaves imbricated on the short branches, heads smaller, sessile or on short scapes. Involucral bracts not so numerous, acute.—Raoulia Mackayi *Buch. in Trans. N.Z. Inst.* xiv (1882) 354, t. 34, f. 2.

North Island: Wellington—Ruahine Mountains, *B. C. Aston!* Mount Holdsworth, *W. Townson!* Tararua Mountains, *B. C. Aston!* Mount Hector, *Petrie!* South Island: Not uncommon in mountain districts, from Nelson to Foveaux Strait. 1500–6000 ft. December–February. Also in Australia.

A variable plant. The most developed form is almost simple, with long radical leaves and long and slender scapes; but it passes by almost imperceptible gradations into the extreme state of var. *Mackayi*, which forms broad much-branched patches, with short imbricated leaves and sessile heads.

6. **G. paludosum** *Petrie in Trans. N.Z. Inst.* xxii (1890) 441.—Very slender, solitary or tufted, 1–2 in. high. Leaves all radical, petiolate, ⅓–1½ in. long, narrow linear-spathulate; blade ½ the length or nearly so, acute or subacute, rather membranous, glabrous or slightly silky above, beneath clothed with white appressed tomentum; midrib prominent; margins flat or slightly recurved. Scapes few, hardly exceeding the leaves in the flowering stage, but elongating in fruit, very slender, almost capillary, cottony; bracts few, small, linear. Head solitary, terminal, ⅕ in. diam.; involucral bracts few, scarious, pale and glistening, darker at the tips, inner linear, glabrous. Female florets very numerous. Achene linear-oblong, papillose. Pappus-hairs very delicate, connate at the base.—*T. Kirk Students' Fl.* (1899) 299; *Cheesem. Man. N.Z. Fl.* (1906) 325. G. minutulum *Col. in Trans. N.Z. Inst.* xxii (1890) 472.

North Island: Waimarino Plains and base of Tongariro, *T. F. C.*, *H. Hill!* Rangipo Plains and Ruahine Mountains, *Petrie!* Kaimanawa Mountains, *B. C. Aston!* South Island: Not uncommon in mountain districts, usually in peaty swamps, from Nelson to Otago. 1500–5500 ft. December–January.

Closely allied to *G. Traversii*, but easily separated by the smaller size and more slender habit, thinner leaves glabrous on the upper surface, smaller heads, and fewer involucral bracts with dark tips. The type specimens of Mr. Colenso's *G. minutulum* are identical with Mr. Petrie's plant.

7. **G. nitidulum** *Hook. f. Handb. N.Z. Fl.* (1864) 154.—A small densely tufted plant, covered in all its parts with appressed silky and shining pale yellowish-brown tomentum. Leaves $\frac{1}{3}$ in. long, densely imbricated and sheathing at the base, spreading above, linear or linear-oblong, flat, obtuse; lower $\frac{1}{3}$ glabrous, membranous; upper $\frac{2}{3}$ densely silky. Heads terminating the branches, solitary, $\frac{1}{3}$ in. diam. or slightly more, on short peduncles barely exceeding the leaves. Involucral scales in 2 series, erect, linear, hyaline, with pale shining tips. Female florets very numerous, much more so than the hermaphrodite; pappus-hairs many, scabrid at the base. Achenes faintly downy.—*T. Kirk Students' Fl.* (1899) 299; *Cheesem. Man. N.Z. Fl.* (1906) 325.

South Island: Nelson—Nelson Mountains, *Sinclair;* Clarence and Wairau Valleys, *W. T. L. Travers;* Upper Clarence Valley, near Lake Tennyson, *R. M. Laing!* 3000–4000 ft. January.

A well-marked species, easily distinguished from its allies by the linear-oblong obtuse leaves covered on both surfaces with dense silky tomentum, short peduncles, and erect linear involucral scales.

8. **G. luteo-album** *Linn. Sp. Plant.* (1753) 851.—Annual or rarely biennial, clothed in all its parts with soft white woolly tomentum. Stems erect, ascending or decumbent, simple or branched at the base, 3–18 in. high. Lower leaves often petiolate, 1–3 in. long, linear or linear-spathulate to obovate-spathulate, obtuse or acute; upper smaller, sessile, linear or lanceolate, acute. Heads $\frac{1}{5}$ in. diam.; pale-yellow or brownish-yellow, glistening, in dense ebracteate clusters arranged in a corymbose manner at the ends of the branches. Involucre almost globose; bracts erect, oblong, obtuse, scarious, tips incurved. Female florets exceedingly numerous; hermaphrodite ones few. Achene minutely papillose.—*A. Rich. Fl. Nouv. Zel.* (1832) 236; *A. Cunn. Precur.* (1838) n. 450; *Raoul Choix* (1846) 45; *Hook. f. Fl. Nov. Zel.* i (1853) 138; *Handb. N.Z. Fl.* (1864) 154; *T. Kirk Students' Fl.* (1899) 298; *Cheesem. Man. N.Z. Fl.* (1906) 326; *Subantarct. Is. N.Z.* ii (1909) 414.

Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands, Auckland Islands: Abundant throughout from sea-level to fully 3500 ft. November–March.

A common plant in almost all warm and many temperate countries.

9. **G. japonicum** *Thunb. Fl. Jap.* (1784) 311.—Annual, erect, 6–20 in. high. Stems often woody at the base, branched, more or less white and cottony. Leaves scattered, 1–4 in. long, oblong-spathulate or linear-spathulate to linear-lanceolate, the lower often petiolate, acute, glabrous above or nearly so, cottony-white beneath. Heads small, $\frac{1}{6}$–$\frac{1}{4}$ in. long, compacted into dense globose clusters or compound heads $\frac{1}{4}$–1 in. diam., which either terminate the branches or are axillary, and are surrounded by 3–6 linear spreading floral leaves. Involucral bracts scarious, hyaline, erect,

obtuse or the inner acute. Female florets very numerous; hermaphrodite ones few, sometimes solitary. Achene slightly compressed, glabrous. Pappus-hairs very slender, hardly connate at the base.—*Benth. Fl. Austral.* iii (1866) 653; *T. Kirk Students' Fl.* (1899) 300; *Cheesem. Man. N.Z. Fl.* (1906) 326. G. involucratum *Forst. f. Prodr.* (1786) 55; *A. Rich. Fl. Nouv. Zel.* (1832) 241; *A. Cunn. Precur.* (1838) n. 453; *Raoul Choix* (1846) 45; *Hook. f. Fl. Nov. Zel.* i (1853) 139; *Handb. N.Z. Fl.* (1864) 155. G. virgatum *Banks and Sol. ex Hook. f. Fl. Nov. Zel.* i (1853) 139. G. lanatum *Forst. f. Prodr.* (1786) 55; *A. Cunn. Precur.* (1838) n. 452. G. Cunninghamii *DC. Prodr.* vi (1837) 235.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout from sea-level to 2500 ft. November–January.

Found also in Norfolk Island, Lord Howe Island, Australia and Tasmania, and northwards to the Malay Archipelago, China, and Japan.

10. **G. collinum** *Lab. Pl. Nov. Holl.* ii (1806) 44, t. 189.—A tufted perennial herb 3–12 in. high, usually with creeping and rooting stolons and slender erect cottony stems. Leaves mostly radical, very variable in size, $\frac{1}{3}$–3 in. long, lanceolate-spathulate or oblong-spathulate, acute or obtuse, petiolate, white and cottony on both surfaces or glabrate above; cauline leaves much smaller and narrower, linear-spathulate, sessile. Heads small, compacted into dense clusters or compound heads similar to those of *G. japonicum*, but smaller and not so compact, and with fewer smaller subtending floral leaves. Involucres broader than in *G. japonicum;* bracts linear-oblong, obtuse, scarious and hyaline. Florets and achenes as in *G. japonicum.*—*Hook. f. Fl. Nov. Zel.* i (1853) 139; *Handb. N.Z. Fl.* (1864) 155; *Benth. Fl. Austral.* iii (1866) 654; *T. Kirk Students' Fl.* (1899) 300; *Cheesem. Man. N.Z. Fl.* (1906) 327. G. simplex *A. Rich. Fl. Nouv. Zel.* (1832) 237; *A. Cunn. Precur.* (1838) n. 451.

Var. **obscurum** *T. Kirk Students' Fl.* (1899) 300.—Forming grey matted patches seldom more than 1 in. high. Leaves $\frac{1}{2}$–$\frac{3}{4}$ in., linear, glabrate above, grey with appressed tomentum beneath. Scape leafy or almost wanting. Heads in terminal fascicles of 2–4 or solitary. Involucral bracts 3–10, linear, obtuse.

Var. **monocephalum** *Hook. f. Fl. Tasm.* ii (1860) 364.—Very small. Leaves all radical, $\frac{1}{8}$ in. long, linear, obtuse or acute. Head solitary, sessile or on a slender filiform scape $\frac{1}{2}$–1 in. high.—*T. Kirk l.c.*

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Plentiful from sea-level to 4500 ft. November–March. The two varieties not uncommon on the mountains of the South Island.

Luxuriant forms of this are best distinguished from *G. japonicum* by being perennial, by the creeping stolons, smaller glomerules with fewer floral leaves, and by the broader involucres. It is also a native of Australia and Tasmania.

11. **RAOULIA** Hook. f.

Perennial herbs, usually of small size, either densely tufted and compacted or creeping and matted. Leaves small, alternate, entire, often closely imbricated. Heads small, solitary, terminal, sessile or nearly so, heterogamous and discoid. Involucre oblong, campanulate or hemispherical; bracts imbricated in 2–many series, the inner ones often with white radiating tips. Receptacle narrow, flat or convex, naked. Florets of the circumference in 1 or several rows, female, filiform, 2–3-toothed. Disc-florets hermaphrodite or sterile, tubular with a funnel-shaped 5-toothed

mouth. Anthers sagittate at the base, produced into fine tails. Style-branches nearly terete, truncate or subcapitate. Achenes oblong. Pappus-hairs in 1 or several series, slender or thickened at the tip.

Taken as a whole, *Raoulia* is a genus founded more upon habit than upon really good and distinctive characters. But it can be easily divided (as was first pointed out by Hooker and Bentham) into two subgenera distinguished by remarkable differences in the pappus-hairs. The first of these, characterized by possessing comparatively few pappus-hairs, which are rigid and thickened at the top, had the name of *Imbricaria* bestowed upon it by Bentham; but, unfortunately, the appellation had already been used. The other subgenus, called by Bentham *Leptopappus*, has much more numerous and much thinner and softer pappus-hairs. During recent years the whole genus has been carefully reviewed by M. Gustave Beauverd, the well-known keeper of the Boissier Herbarium, and as the result of a very complete and painstaking inquiry, published in the "Bulletin of the Botanical Society of Geneva" for 1910–12, we now have a full account of the whole of the species. I have gladly availed myself of Beauverd's work, and with few exceptions have followed the arrangement of the species adopted by him. I have also adopted his suggestion of the names *Psychrophyton* and *Eu-Raoulia* for the two primary divisions of the genus.

Subgenus 1. PSYCHROPHYTON. Pappus-hairs 15–25, in 1 series, compressed, thickened towards the top and furnished with clavate papillae.

* *Uninerves. Leaves 1-nerved at the base; acuminate or rounded at the summit.*

Leaves glabrous, spreading, rigid, subulate. Inner involucral bracts without white radiating tips .. .. 1. *R. subulata.*

Forming large compact masses. Leaves densely imbricate, linear-spathulate, upper $\frac{1}{3}$ with a dense tuft of hairs concealing the leaf. Inner involucral bracts without white radiating tips .. .. 2. *R. eximia.*

Forming compact masses. Leaves densely imbricate, obovate-spathulate, upper part clothed on both surfaces with long straight hairs. Inner involucral bracts with white radiating tips .. 3. *R. mammillaris.*

** *Truncatae. Leaves 1-nerved at the base; truncate or retuse at the tip.*

Forming compact greenish masses. Leaves densely imbricated, linear-oblong, truncate, tip of upper surface clothed with dense straight hairs, naked beneath .. .. 4. *R. Goyeni.*

Forming compact masses. Leaves densely imbricated, obovate-spathulate, upper part clothed on both sides with straight hairs concealing the leaves, but extreme tip naked .. .. .. 5. *R. rubra.*

Forming compact masses. Leaves densely imbricate, broadly cuneate or flabellate, truncate, tip of upper surface clothed with dense straight hairs, beneath glabrous and corrugated .. .. 6. *R. Buchanani.*

*** *Trinerves. Leaves 3-nerved at the base, the lateral nerves weak.*

Forming pulvinate masses 6–12 in. diam. Leaves densely imbricate, narrow-obovate, recurved at the apex, upper surface with long soft hairs above the middle, under-surface almost wholly covered. Inner involucral scales not radiating. Florets 20–40 .. .. 7. *R. Loganii.*

Forming compact patches. Leaves densely imbricate, rhomboid-spathulate, tips clothed on both surfaces with close tomentum. Inner involucral scales with radiating tips. Florets 8–15 .. 8. *R. bryoides.*

Branches not closely compacted. Leaves densely imbricate, rhomboid-spathulate, larger than those of *R. bryoides*. Heads $\frac{3}{8}$ in. diam. Florets 20–40 .. .. 9. *R. Gibbsii.*

Leaves spathulate or obovate-oblong, silky-pubescent on both surfaces. Heads large, $\frac{1}{3}$–$\frac{1}{2}$ in. diam. Inner involucral scales with long white radiating tips .. .. 10. *R. Youngii.*

Stems tufted or simple. Leaves $\frac{1}{6}$–$\frac{1}{3}$ in., white and silvery, ovate- or lanceolate-subulate. Heads large, $\frac{1}{3}$–$\frac{2}{3}$ in. diam. Inner involucral scales with long white radiating tips .. .. .. 11. *R. grandiflora.*

Forming broad flattened patches. Leaves ovate, obtuse; upper $\frac{1}{2}$ clothed with silvery tomentum; lower $\frac{1}{2}$ membranous and glabrous. Inner involucral scales not white at the tips .. 12. *R. Hectori.*

Subgenus II. Eu-Raoulia. Pappus-hairs 5–100 or 150, in many series, very thin and slender, usually denticulate.

* *Radiatae. Inner involucral scales with white radiating tips.*

Stems laxly branched. Leaves densely imbricated, $\frac{1}{5}$–$\frac{1}{4}$ in., recurved, obovate-spathulate, obtuse. Heads $\frac{1}{4}$ in. diam. Florets 30–50 .. .. 13. *R. Petriensis.*

Stems stout, matted. Leaves closely imbricate, spreading and recurved, obovate-spathulate, densely silky-tomentose except at the base .. .. 14. *R. Parkii.*

Stems stout, matted. Leaves laxly imbricate, erecto-patent, linear-oblong, silky or glabrate .. .. 15. *R. subsericea.*

Stems slender, laxly imbricate. Leaves laxly imbricate, erecto-patent, linear-oblong, glabrous or nearly so .. .. .. 16. *R. glabra.*

Stems densely tufted. Leaves very small, $\frac{1}{20}$–$\frac{1}{12}$ in., broadly spathulate, limb covered on both surfaces with silvery pubescence. Inner involucral scales brilliant citron-yellow .. .. .. 17. *R. lutescens.*

** *Eradiatae. Inner involucral scales not white and radiating. Leaves spathulate, recurred, obtuse or retuse, greyish-pubescent.*

Forming broad patches. Leaves $\frac{1}{12}$ in., white and silvery, obovate-spathulate, 3-nerved at the base. Inner involucral scales pale-yellow .. .. 18. *R. australis.*

Small, prostrate and rooting, greyish-white. Leaves closely imbricate, conspicuously distichous, spreading and recurved .. 19. *R. Monroi.*

Forming large compact irregularly shaped greenish cushions. Leaves rigid, erect, dilated and 3-nerved at the base, almost glabrous. Heads small, $\frac{1}{6}$ in. long .. .. 20. *R. Haastii.*

Stems slender, prostrate and creeping. Leaves lanceolate-spathulate, laxly imbricate. Greyish tomentose or nearly glabrate .. 21. *R. tenuicaulis.*

Forming ashy-grey patches; stems almost woody. Leaves closely imbricate, suberect, incurved at the tip, linear-subulate, densely clothed with greyish-white tomentum .. .. .. 22. *R. cinerea.*

1. **R. subulata** *Hook. f. Handb. N.Z. Fl.* (1864) 149.—A small densely tufted species forming moss-like patches 1–3 in. diam., perfectly glabrous in all its parts; branches $\frac{1}{3}$–1 in. high. Leaves very closely imbricated, suberect or patent, $\frac{1}{8}$–$\frac{1}{4}$ in. long, subulate-lanceolate, acuminate, 1-nerved. Heads $\frac{1}{6}$ in. diam.; involucral bracts in 2–3 series, linear-lanceolate, scarious, irregularly denticulate, acuminate, not white nor radiating. Receptacle convex, hispid with linear-clavate papillae as also the achenes. Florets 18–25, the females usually rather fewer in number than the hermaphrodite ones. Pappus-hairs somewhat rigid, thickened at the tips. — *T. Kirk Students' Fl.* (1899) 304; *Cheesem. Man. N.Z. Fl.* (1906) 332. Psychrophyton subulatum *Beauverd in Bull. Soc. Bot. Genève*, ii (1910) 234.

South Island: Nelson—Mountains above the Wairau Gorge, *Sinclair*, *T. F. C.* Canterbury—Mountains above Arthur's Pass, *T. F. C.*; Rangitata Valley, *J. B. Armstrong!* Mount Cook district, *T. F. C.* Otago—Lake district, *Hector* and *Buchanan!* Hector Mountains, Mount Pisa, Mount Tyndall, *Petrie!* 4000–6500 ft. December–February.

T. 71 : 96.

A well-marked species, not closely related to any other.

2. **R. eximia** *Hook. f. Handb. N.Z. Fl.* (1864) 149.—Forming large rounded or amorphous densely compacted masses from a few inches to several feet long and sometimes over 2 ft. high. Root stout, woody; branches short, with the leaves $\frac{1}{4}$ in. diam. Leaves most densely packed, imbricated all round the branch in many series, linear-obovate or linear-cuneate, rounded at the tip, membranous, slightly enlarged towards the base, 1-nerved, bearing on both surfaces towards the tip a dense tuft of straight white hairs which project beyond the leaf and entirely conceal

it. On the back of the leaf the hairs often extend half-way down the leaf or more, but on the upper surface the lower $\frac{2}{3}$ is usually quite glabrous. Heads numerous, small, sunk among the leaves at the tips of the branches; involucral bracts in 2 series, narrow-linear, scarious, with a tuft of hairs above the middle, not white at the tips. Florets 8–12 or more, the hermaphrodite ones more numerous than the female. Achene clothed with long silky hairs, and with a thickened areole at the base. Pappus-hairs few, rigid, thickened at the tip.—*T. Kirk Students' Fl.* (1899) 304; *Cheesem. Man. N.Z. Fl.* (1906) 332; *Beauverd in Bull. Soc. Bot. Genève*, ii (1912) 47. Psychrophyton eximium *Beauv. l.c.* (1910).

see Trans 65 : 224

South Island: Nelson—Mount Peel, *T. F. C.*; Canterbury—Mount Torlesse, Mount Dobson, Mount Cook district, not uncommon. Otago—Lake district, *Buchanan!* Mount Ida Range, *Petrie!* 4000–6000 ft. December–January.

I have seen no specimens of Mr. Kirk's var. *lata*, apparently distinguished by the broader and shorter less closely imbricate leaves. Nor are there any specimens in his herbarium of *R. Brownii* T. Kirk, previously separated from *R. eximia* on account of the linear-oblong acute leaves.

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3. **R. mammillaris** *Hook. f. Handb. N.Z. Fl.* (1864) 150.—Forming hard compact masses similar in size and aspect to those of *R. eximia*. Branches short, stout, with the leaves quite $\frac{1}{4}$ in. diam. Leaves most densely packed, imbricated all round the branches in many series, spreading, $\frac{1}{12}$–$\frac{1}{8}$ in. long, obovate-cuneate or spathulate, rounded or almost truncate at the tip, membranous, glabrous or nearly so in the lower $\frac{1}{2}$, in the upper $\frac{1}{2}$ clothed on both surfaces with a dense tuft of straight hairs which project just beyond the tip and conceal the leaf. Heads $\frac{1}{6}$–$\frac{1}{4}$ in. diam., sunk among the leaves at the tips of the branches; involucral bracts in about 2 series, the inner linear-oblong, scarious, with conspicuous white obtuse or subacute radiating tips. Florets 10–12, the hermaphrodite ones more numerous than the females. Achene clothed with long silky hairs, and with a thickened areole at the base. Pappus-hairs few, rigid, thickened at the tips.—*T. Kirk Students' Fl.* (1899) 306; *Cheesem. Man. N.Z. Fl.* (1906) 334; *Beauverd in Bull. Soc. Bot. Genève*, ii (1912) 47. Psychrophyton mammillare *Beauverd l.c.* (1910) 232, t. 14. see Trans 65 : 225

South Island: Nelson—Mount Starveall, *Bryant* ("Students' Flora"); locality not stated, *Berggren* (*fide* Beauverd). Canterbury—Mount Torlesse, *Haast* (Handbook). Otago—Alps of the Lake district, *Buchanan!* 4000–6000 ft. *Vegetable sheep.*

The conspicuous white radiating tips to the inner involucral bracts distinguish this at a glance from *R. eximia*, but in the absence of flowers it is by no means easy to separate the two species. The leaves of *R. mammillaris*, however, are shorter and broader, with shorter hairs which do not project so far beyond the tip of the leaf as in *R. eximia*. Beauverd figures glandular hairs as being present mixed with the ordinary ones on the leaves, but I do not find such in Buchanan's specimens, which are all that I have seen.

4. **R. Goyeni** *T. Kirk in Trans. N.Z. Inst.* xvi (1884) 373.—Forming hard compact greenish masses from a few inches to 2 or 3 ft. long, but rarely more than 6 or 8 in. high. Branches very short, closely compacted and often subangular from mutual pressure, with the leaves $\frac{1}{5}$–$\frac{1}{4}$ in. diam. Leaves very closely packed, densely imbricated in many series, $\frac{1}{8}$–$\frac{1}{6}$ in. long, linear-oblong, sessile by a broad base, rather wider and truncate at the tip, glabrous beneath, on the upper surface bearing near the tip a dense

tuft of straight white hairs slightly longer than the leaf, the extreme upper margin naked although concealed by the hairs. Heads small, deeply sunk among the leaves at the tips of the branches; involucral bracts in 2 series; the outer linear-spathulate, scarious, bearing a tuft of hairs at the tip; the inner linear, scarious, obtuse, some of them with short hardly radiating white tips. Florets few. Achene hispid, with a thickened areole. Pappus-hairs few, thickened upwards.—*Students' Fl.* (1899) 306; *Cheesem. Man. N.Z. Fl.* (1906) 335; *Beauverd in Bull. Soc. Bot. Genève,* ii (1912) 49. Psychrophyton Goyeni *Beauv. l.c.* (1910) 234.

STEWART ISLAND: An abundant plant, chiefly in rocky places or subalpine meadows. Rakiahua, *P. Goyen! T. Kirk! Cockayne!* Mount Anglem, *T. Kirk! Cockayne;* Table Hill, *Cockayne;* Smith's Lookout, *T. Kirk!* 1000–3000 ft.

A very peculiar species, forming large greenish masses, presenting quite a different appearance to that of any other member of the genus.

5. **R. rubra** *Buch. in Trans. N.Z. Inst.* xiv (1882) 350, t. 30, f. 2.—Forming hard compact masses 6–12 in. diam. and 4–8 in. high; branches with the leaves $\frac{1}{6}$–$\frac{1}{5}$ in. diam. Leaves closely packed, imbricated in many series, $\frac{1}{8}$–$\frac{1}{6}$ in. long, broadly obovate-spathulate or cuneate, rounded or almost truncate at the tip, membranous, upper part clothed on both surfaces with long straight hairs which project beyond the leaf, but the extreme tip naked on both sides though concealed by the hairs, lower portion of the leaf glabrous on both surfaces. Heads small, $\frac{1}{10}$ in. diam., sunk among the terminal leaves; involucral bracts numerous, linear, obtuse, glabrous, the inner with short white radiating tips. Florets 10–14; corolla dark-crimson. Achene clothed with long silky hairs. Pappus-hairs few, rigid, thickened at the tips.—*T. Kirk Students' Fl.* (1899) 305; *Cheesem. Man. N.Z. Fl.* (1906) 334; *Beauverd in Bull. Soc. Bot. Genève,* ii (1912) 47. Psychrophyton rubrum *Beauverd l.c.* (1910) 234.

NORTH ISLAND: Mount Holdsworth, Tararua Range, *Buchanan! T. P. Arnold! W. Townson!* Mount Hector, *B. C. Aston! Petrie!* 4000–4500 ft.

6. **R. Buchanani** *T. Kirk Students' Fl.* (1899) 307.—Apparently forming hard compact masses. Branches short, stout, with the leaves on $\frac{1}{4}$ in. diam. Leaves closely packed, imbricated in several series, $\frac{1}{8}$–$\frac{1}{6}$ in. long and almost as broad at the tip, broadly cuneate, truncate, membranous; upper surface with the lower $\frac{2}{3}$ quite glabrous, above that clothed with straight hairs which project just beyond the tip, forming a kind of fringe; under-surface with the lower $\frac{1}{2}$ loosely silky, the upper $\frac{1}{2}$ glabrous, more or less corrugated or wrinkled. Heads small, hidden among the leaves at the tips of the branches. Involucral bracts in 2 series, lanceolate, concave, acute, glabrous within; without ciliate at the base, glabrate at the apex. Florets few, short; pappus-hairs and styles of equal length. Achene setose.—*Cheesem. Man. N.Z. Fl.* (1906) 335; *Beauverd in Bull. Soc. Bot. Genève,* ii (1912) 50, t. 12.

SOUTH ISLAND: Otago—Mountains above the Haast River, *R. A. Wilson!* Mackinnon's Pass, *F. G. Gibbs!* mountains above Lake Harris, *H. J. Matthews!* Routeburn, *Poppelwell!* Mount Alta, *Buchanan!* Tooth Peaks (Lake Wakatipu), Mount Ernest (McKerrow Range), *Cockayne!* 4500–6000 ft. January–February.

The manner in which the hairs are placed on the leaves is well worth examination. On the upper surface they are confined to the upper $\frac{1}{2}$ of the leaf, forming a straight dense fringe just reaching above the level of the truncate tip of the leaf, the lower part of the leaf being quite glabrous and wrinkled when dry. The back, or under-surface, of the leaf is furnished with a lax tuft of long silky hairs springing from the base of the leaf; but above that the leaf is quite glabrous.

7. **R. Loganii** *Cheesem. n. comb.*—Forming pulvinate masses 6–12 in. diam. Branches slender, woody at the base, with the leaves $\frac{1}{3}$–$\frac{3}{8}$ in. diam., the whole plant clothed with soft whitish or brownish tomentum. Leaves densely imbricating, $\frac{1}{4}$ in. long, obovate or oblong-obovate, rounded or cuneate at the top, membranous, 3-nerved at the base, recurved at the apex, clothed with long soft hairs above the middle of the upper surface, but which cover the greater part of the under-surface. Heads $\frac{1}{4}$ in. diam., sunk among the leaves at the tips of the branches; involucral bracts 2–3 series, linear-oblong, obtuse, scarious, the outer with a tuft of woolly hairs on the back. Florets 20–40, the hermaphrodite much more numerous than the female. Achene clothed with long silky hairs, and with a thickened areole at the base. Pappus-hairs comparatively few, rigid, thickened above and furnished with clavate papillae.—Haastia Loganii *Buch. in Trans. N.Z. Inst.* xiv (1882) 350, t. 30, f. 3. Helichrysum Loganii *T. Kirk Students' Fl.* (1899) 310; *Cheesem. Man. N.Z. Fl.* (1906) 340.

North Island: Mount Holdsworth, Tararua Range, *Buchanan! T. P. Arnold! W. Townson! B. C. Aston!* Mount Hector, *B. C. Aston! Petrie!* Stewart Island: Near the summit of Mount Anglem, *Cockayne!* ("Report on Botany of Stewart Island," p. 64, under *Helichrysum*). 4000–5000 ft. January.

Originally placed in *Haastia* by Buchanan, probably on account of its soft woolly habit, for it does not possess the numerous female flowers of that genus. Kirk transferred it to *Helichrysum;* but the pappus-hairs are precisely those of the section *Psychrophyton* of *Raoulia,* in which genus it must be placed.

8. **R. bryoides** *Hook. f. Fl. Nov. Zel.* ii (1855) 332.—Forming hard and dense convex patches 2–8 in. diam. Lower portion of the stem hard and woody, roots long and stringy. Branches short, stout, with the leaves $\frac{1}{8}$–$\frac{1}{4}$ in. diam. Leaves very closely packed, imbricated in several series all round the branch, erecto-patent, $\frac{1}{10}$–$\frac{1}{8}$ in. long, narrow obovate-spathulate or rhomboid-spathulate, subacute or obtuse; lower $\frac{2}{3}$ glabrous or slightly woolly, upper $\frac{1}{3}$ about triangular, coriaceous, clothed on both surfaces with closely felted silky hairs which do not conceal the shape of the leaf, and with a tuft of cottony wool on each side. Heads $\frac{1}{5}$–$\frac{1}{4}$ in. diam., sunk among the terminal leaves; involucral bracts in 2–3 series, linear-oblong, scarious, acute, inner with white radiating tips. Florets 8–14, the hermaphrodite ones more numerous than the females. Achene with long silky hairs and a thickened areole at the base. Pappus-hairs few, rigid, thickened at the tips.—*Handb. N.Z. Fl.* (1864) 150; *T. Kirk Students' Fl.* (1899) 307; *Cheesem. Man. N.Z. Fl.* (1906) 336; *Beauverd in Bull. Bot. Soc. Genève,* ii (1912) 51. Psychrophyton bryoides *Beauverd l.c.* (1910) 234.

South Island: Common on the mountains of Nelson and Marlborough. Canterbury—Mount Torlesse, *Cockayne!* Black Range, *T. F. C.;* Craigieburn Mountains, *Petrie!* Otago—Mount Pisa and the Hector Mountains, *Petrie!* 3500–6500 ft. December–January.

Easily distinguished from *R. eximia, R. mammillaris,* &c., by the hairs on the leaves not enveloping them so as to conceal their shape.

9. **R. Gibbsii** *Cheesem. in Trans. N.Z. Inst.* xlii (1910) 216.—Forms small patches 6–9 in. diam., much more laxly branched than is usual in the genus. Branches stout, erect or suberect, 2–5 in. long, with the leaves on $\frac{1}{4}$–$\frac{1}{3}$ in. diam., not forming a hard compact mass as in *R. bryoides.*

Leaves very closely imbricated, erecto-patent, $\frac{1}{5}$–$\frac{1}{6}$ in. long, obovate-spathulate or rhomboid-spathulate, obtuse or subacute, upper $\frac{1}{2}$ triangular, coriaceous, clothed on both surfaces with densely felted woolly hairs, which, as in *R. bryoides*, do not conceal the shape of the leaf; basal $\frac{1}{2}$ membranous, 3-nerved when the tomentum is removed, upper surface glabrate or nearly so, lower surface slightly silky; margins furnished right to the base with long cottony hairs. Heads $\frac{3}{8}$ in. diam., solitary, terminal, sunk amongst the uppermost leaves; involucral bracts in 3–4 series, linear-oblong, scarious, acute, much smaller in proportion to the size of the head than in *R. bryoides*, and the inner ones with much less conspicuous white tips. Florets 20–40, the hermaphrodite about equal in number to the females. Achenes with long silky hairs and a conspicuous thickened areole. Pappus-hairs few, fragile, thickened at the tips.

South Island: Nelson—Dun Mountain Range, on Mount Starveall and Slaty Peak, alt. 4000–5000 ft., *F. G. Gibbs!*

Although this is technically closely allied to *R. bryoides*, in appearance it differs widely from that plant. *R. bryoides* forms hard and compact knobby masses in which the numerous branches are so closely packed that it is impossible to thrust the finger in between. *R. Gibbsii* is comparatively laxly branched, with longer, stouter, and more erect branches, and the leaves are much larger. The heads are also larger, with double the number of florets, and the scales of the involucre are proportionately smaller and less numerous.

Mr. Gibbs, who is the first to gather this interesting species, informs me that at a little distance it can be easily mistaken for a barren specimen of *Leucogenes grandiceps*.

10. **R. Youngii** *Beauverd in Bull. Bot. Soc. Genève*, ii (1912) 47.—Densely tufted, forming broad soft patches $\frac{3}{4}$–$1\frac{1}{2}$ in. high; branches stout, erect, with the leaves $\frac{1}{3}$ in. diam. Leaves densely imbricate, erecto-patent or spreading, $\frac{1}{6}$–$\frac{1}{4}$ in. long, obovate-oblong, obtuse, sessile by a broad base, densely clothed on both surfaces with soft white or buff cottony tomentum. Heads $\frac{1}{3}$–$\frac{1}{2}$ in. diam., sessile amongst the terminal leaves; involucral bracts in about 3 series; the outer shorter, woolly and tomentose at the base; the inner longer, linear-oblong, acute, with white radiating tips almost equalling the scarious claw, and much exceeding the florets. Florets numerous, 50–70; about 20–30 females, in 2 series. Achene pubescent. Pappus-hairs few, rigid, brittle, slightly thickened above.—Gnaphalium (Helichrysum) Youngii *Hook. f. Handb. N.Z. Fl.* (1864) 152. Helichrysum Youngii *T. Kirk Students' Fl.* (1899) 310; *Cheesem. Man. N.Z. Fl.* (1906) 339. Psychrophyton Youngii *Beauverd in Bull. Bot. Soc. Genève*, ii (1910) 230.

South Island: Canterbury—Mount Torlesse and Mount Cook, *Haast! T. F. C.* Otago—Lake Hawea, *Haast;* Lake Wanaka, *Buchanan!* Mount Pisa, Mount Cardrona, Hector Mountains, *Petrie!* 4500–6500 ft. January–February.

In the first edition of this work (p. 339) I remarked that "this differs from *Helichrysum* in habit and in the numerous female florets, and would perhaps be more appropriately placed in *Raoulia*, of which it has the pappus-hairs of the section *Imbricaria*." In 1912 Beauverd adopted the suggestion thus made. It is a beautiful little snow-white plant, often forming large patches in alpine districts.

11. **R. grandiflora** *Hook. f. Fl. Nov. Zel.* i (1853) 136, t. 37A.—Stems $\frac{1}{2}$–2 in. long, tufted, simple or branched at the base, stout, $\frac{1}{3}$–$\frac{1}{2}$ in. diam. with the leaves, erect or curved; roots long and wiry. Leaves imbricated all round the stem, $\frac{1}{6}$–$\frac{1}{3}$ in. long, ovate- or lanceolate-subulate, gradually tapering to a subacute tip, rigid, striate on the back, clothed with silvery

appressed tomentum, loosely cottony towards the base. Heads large, $\frac{1}{3}$–$\frac{2}{3}$ in. diam., sunk among the terminal leaves; involucral bracts in about 2 series; the outer few, short, scarious; inner linear, obtuse, spreading, with long white radiating tips; receptacle small, convex, hispid. Florets 25–40, about $\frac{1}{3}$ female, narrow, the rest hermaphrodite. Achene silky. Pappus-hairs rather slender, thickened at the tips. — *Handb. N.Z. Fl.* (1864) 150; *T. Kirk Students' Fl.* (1899) 305; *Cheesem. Man. N.Z. Fl.* (1906) 333; *Beauverd in Bull. Bot. Soc. Genève*, ii (1912) 51. Psychrophyton grandiflorum *Beauverd l.c.* (1910) 232, fig. xiii; *Cockayne Veg. N.Z.* (1921) t. 75.

Var. **fasciculata** *Cheesem.*—As in *R. grandiflora*, but flower-heads 3 to a stem. —Helichrysum fasciculatum *Buch. in Trans. N.Z. Inst.* ix (1877) 529, t. 19; *T. Kirk Students' Fl.* (1899) 310; *Cheesem. Man. N.Z. Fl.* (1906) 340; *Trans. N.Z. Inst.* xliv (1912) (*Proceedings*) 25.

North and South Islands: Frequent in mountain districts from the East Cape (Hikurangi) and Taupo to Foveaux Strait. 3000–6000 ft. December–January. Var. *fasciculata:* Tararua Mountains, *H. H. Travers!*

This species and *R. Youngii* differ greatly in habit from the other species of *Raoulia*, but the structure of the florets is that of the section *Psychrophyton*, in which they must be placed. With regard to var. *fasciculata*, I have shown in a note printed in Trans. N.Z. Inst. xliv (1912) (Proceedings), p. 25, that the structure of the florets is also that of *Psychrophyton*, and that the plant only differs from *R. grandiflora* in having 3 flower-heads to a stem.

12. **R. Hectori** *Hook. f. Handb. N.Z. Fl.* (1864) 149.—Often forming broad dense patches. Stems prostrate, much branched, 1–3 in. long; branches $\frac{1}{2}$–2 in. high, close-set, erect or ascending. Leaves closely imbricated, erecto-patent, $\frac{1}{10}$–$\frac{1}{8}$ in. long, broadly ovate, obtuse, upper $\frac{1}{2}$ thick and coriaceous and clothed with appressed silvery tomentum, lower $\frac{1}{2}$ membranous, glabrous, back longitudinally grooved when dry. Heads small, $\frac{1}{10}$–$\frac{1}{6}$ in. diam., sunk amongst the terminal leaves; involucral bracts in 2 series, linear-oblong, scarious, subacute, glabrous, not white at the tips. Florets 10–18; female 3–6. Achene glabrous or nearly so. Pappus-hairs few, rigid, thickened at the tips.—*T. Kirk Students' Fl.* (1899) 304; *Cheesem. Man. N.Z. Fl.* (1906) 333; *Ill. N.Z. Fl.* i (1914) t. 104A; *Beauverd in Bull. Bot. Soc. Genève*, ii (1912) 48. Psychrophyton Hectori *Beauverd l.c.* (1910) 231.

Var. **mollis** *Buch. ex T. Kirk Students' Fl.* (1899) 305.—Smaller and not so rigid. Leaves not so closely imbricated, broader and softer, cottony at the base, not so silvery at the tip. Heads smaller. Florets 6–10. Achenes glabrous.—*Cheesem. Man. N.Z. Fl.* (1906) 333.

South Island: Canterbury—Mount Dobson Range, abundant, *T. F. C.* Otago—Lake district, *Hector* and *Buchanan!* Mount St. Bathan's, Hector Mountains, Mount Pisa, Ben Lomond, *Petrie!* Mount Cardrona, Mount Ida, Old Man Range, *Cockayne!* Garvie Mountains, *J. Speden!* 4000–6500 ft. December–January. Var. *mollis:* Mount St. Bathan's, *Petrie.*

Usually found on steep rocky slopes, where it forms broad flattened patches, often covering considerable areas. It never shows any tendency to form the rounded cushion-shaped masses so characteristic of *R. eximia*, *R. mammillaris*, and *R. Buchanani.*

13. **R. Petriensis** *T. Kirk in Trans. N.Z. Inst.* ix (1877) 549.—Forming laxly branched patches. Stems 2–6 in. long, prostrate or suberect; branches numerous, ascending or more or less erect, viscid, $\frac{1}{6}$–$\frac{1}{5}$ in. diam. with the leaves on. Leaves laxly to densely imbricating, $\frac{1}{5}$–$\frac{1}{4}$ in. long, obovate-spathulate, truncate or retuse or obtuse at the apex; base erect,

membranous, 3-nerved, loosely cottony; tip spreading or recurved, coriaceous, clothed with densely felted shining tomentum. Heads $\frac{1}{4}$ in. diam., sessile among the terminal leaves; involucral bracts in 2 series, linear, scarious, obtuse, the inner with short white radiating tips. Florets 30–50, the hermaphrodite ones much more numerous than the female. Pappus-hairs mixed, some with the thickened apex of the *Psychrophyton* section, others of the thinner type of *Eu-Raoulia*. Achene glabrous or shortly puberulous.—*Students' Fl.* (1899) 305; *Cheesem. Man. N.Z. Fl.* (1906) 334; *Ill. N.Z. Fl.* i (1914) f. 104B; *Beauverd in Bull. Bot. Soc. Genève*, ii (1912) 52, t. 13. See Trans. 72 36. & 71:96.

South Island: Canterbury—Mount Dobson Range, *T. F. C.* Otago—Mount Ida and Mount St. Bathan's, *Petrie!* 3500–5500 ft. December–January.

A remarkably distinct species, at once recognized by the loosely tufted habit, long slender branches, spreading and recurved leaves, and numerous florets. It offers a transition between the section *Psychrophyton* and that of *Eu-Raoulia*.

14. **R. Parkii** *Buch. in Trans. N.Z. Inst.* xiv (1882) 355, t. 34, f. 3.—Stems 1–6 in. long, prostrate, creeping and rooting, often densely matted and forming large patches; branches short, erect or ascending, $\frac{1}{2}$–1 in. long. Leaves closely imbricated, spreading and recurved, $\frac{1}{10}$–$\frac{1}{6}$ in. long, obovate-spathulate, obtuse, clothed with white or buff woolly appressed tomentum except towards the base, which is usually glabrous. Heads $\frac{1}{6}$–$\frac{1}{4}$ in. diam., sessile among the terminal leaves; involucral bracts in 2–3 series; the outer short, tomentose on the outside; the inner longer, linear-oblong, obtuse, with white radiating tips. Florets 15–25, the females about equal to the hermaphrodite ones in number. Achene puberulous. Pappus-hairs slightly thickened at the tips.—*Cheesem. Man. N.Z. Fl.* (1906) 331; *Beauverd in Bull. Bot. Soc. Genève*, ii (1910) 227.

South Island: Canterbury—Lake Tekapo, Mount Dobson, Mount Ollivier, *T. F. C.* Otago—Mount Alta, *Buchanan!* Lake Wanaka, Hector Mountains, Old Man Range, Ida Valley, and elsewhere in Central Otago, *Petrie!* Mount Walter, *Cockayne!* 2500–5500 ft. December–January. T.71:97.

A well-marked species, more nearly allied to *R. subsericea* than to any other.

15. **R. subsericea** *Hook. f. Fl. Nov. Zel.* i (1853) 136.—Stouter than *R. glabra*, and more closely branched, forming smaller and more compact patches with shorter erect branches. Leaves rather longer and broader than in *R. glabra*, laxly imbricated, $\frac{1}{6}$–$\frac{1}{4}$ in. long, linear-oblong, obtuse or subacute, flat or nearly so, usually sparingly clothed with thin silvery tomentum or rarely almost glabrous. Heads rather larger, $\frac{1}{3}$ in. diam.; involucral bracts broader, the innermost with larger and more conspicuous white radiating tips. Florets similar to those of *R. glabra*, but fewer in number. Achene glabrous. Pappus-hairs copious, soft, slightly thickened at the tips.—*Handb. N.Z. Fl.* (1864) 150; *T. Kirk Students' Fl.* (1899) 303; *Cheesem. Man. N.Z. Fl.* (1906) 331; *Beauverd in Bull. Bot. Soc. Genève*, ii (1910) 226, t. ix.

South Island: Abundant in mountain districts throughout. 1000–4500 ft. December–January.

Very closely allied to *R. glabra*, but generally recognized without difficulty by the more compact habit, silky leaves, rather larger heads with more conspicuous white tips to the inner involucral bracts, and by the pappus-hairs being slightly thickened above.

16. **R. glabra** *Hook. f. Fl. Nov. Zel.* i (1853) 135.—Stems long, slender, prostrate, much branched, forming lax patches 3–24 in. across; branches ascending, 1–3 in. long. Leaves pale yellow-green, laxly imbricated or somewhat remote, spreading or erecto-patent, $\frac{1}{8}$–$\frac{1}{5}$ in. long, linear-ligulate or linear-oblong, acute or obtuse, flat or nearly so, 1-nerved, glabrous or slightly silky, sometimes with a minute pencil of hairs at the tip. Heads rather large, $\frac{1}{4}$–$\frac{1}{3}$ in. diam.; involucral bracts in 3–4 series; outer green, ovate-oblong, acuminate; inner longer, linear-oblong, with white radiating tips. Florets numerous, 30–50; female in 2 series, rather less in number than the hermaphrodite ones. Achene puberulous. Pappus-hairs copious, soft, not thickened at the tips.—*Handb. N.Z. Fl.* (1864) 149; *T. Kirk Students' Fl.* (1899) 303; *Cheesem. Man. N.Z. Fl.* (1906) 331; *Ill. N.Z. Fl.* i (1914) t. 102B; *Beauverd in Bull. Bot. Soc. Genève*, ii (1910) 225, t. viii

North Island: Mount Egmont, *T. F. C., W. Townson! Cockayne;* Ruahine Mountains, *Cockayne;* Tararua Mountains, *Buchanan, B. C. Aston!* Rimutaka Mountains, descending almost to sea-level to the north of Cape Palliser, *T. Kirk!* South Island: Abundant throughout in mountain districts. Stewart Island: Half-moon Bay, rare, *Cockayne.* Sea-level to 4000 ft. December–January.

17. **R. lutescens** *Beauverd in Bull. Bot. Soc. Genève*, ii (1910) 221, t. 5.—Stems prostrate, wide-creeping, often forming dense mats of considerable size; ultimate branchlets short, erect, densely leafy. Leaves very small, regularly and densely imbricated, $\frac{1}{20}$–$\frac{1}{12}$ in. long, broadly spathulate, emarginate or truncate at the apex; limb with both surfaces covered with a dense white and silvery pubescence; petiolar part broad, glabrous or nearly so, 1-nerved. Heads small, $\frac{1}{8}$–$\frac{1}{6}$ in. diam., sessile, terminating the branchlets; involucral bracts in 2 series, the inner spreading, brilliant citron-yellow. Florets 12–20 or more, the females usually equalling the hermaphrodite in number. Pappus-hairs numerous, slender, not thickened at the tips.—R. australis *var.* lutescens *T. Kirk Students' Fl.* (1899) 302; *Cheesem. Man. N.Z. Fl.* (1906) 329.

North Island: In various localities from Tarawera Mountain and Taupo southwards, often confused with *R. australis.* South Island: Not uncommon in the broad shingly river-valleys. 1000–3500 ft. December–February.

Easily distinguished from *R. australis* by the much smaller and much more closely imbricated leaves, and by the smaller heads, the inner involucral scales of which are a brilliant citron-yellow.

18. **R. australis** *Hook. f. ex Raoul Choix* (1846) 20, t. 15.—Forming broad flat patches. Stems 1–6 in. long, much interlaced, prostrate and rooting; branches numerous, closely packed, short, erect, $\frac{1}{2}$–$1\frac{1}{2}$ in. high. Leaves laxly or densely imbricated, erect or spreading or recurved, $\frac{1}{15}$–$\frac{1}{8}$ in. long, linear- or obovate-spathulate to rounded spathulate, obtuse at the tip, concave, more or less clothed on both surfaces with white or yellowish tomentum, especially towards the tip. Heads $\frac{1}{8}$–$\frac{1}{4}$ in. long; involucral bracts in 2–3 series; outer spathulate, tomentose; inner linear, obtuse, scarious, shining, pale-yellow. Florets from 12 to 20 or more, the females equalling or exceeding the hermaphrodite ones in number. Achene glabrous or minutely pubescent. Pappus-hairs very numerous, extremely slender, not thickened at the tips.—*Fl. Nov. Zel.* i (1853) 135; *Handb. N.Z. Fl.* (1864) 148; *T. Kirk Students' Fl.* (1899) 302; *Cheesem. Man. N.Z. Fl.* (1906) 329; *Beauverd in Bull. Bot. Soc. Genève*, ii (1910) 219, t. 4. R. Mackayi *Buch. in Trans. N.Z. Inst.* xiv (1882) 354, t. 34, f. 2. R. albosericea *Col. in Trans. N.Z. Inst.* xx (1888) 195.

see p. 965

Var. **apice-nigra** *T. Kirk Students' Fl.* (1899) 302. Leaves more densely tomentose, white with soft woolly hairs. Involucral bracts brownish-black at the tips.—*Beauverd in Bull. Bot. Soc. Genève*, ii (1912) 49, 53. R. Monroi *Beauverd l.c.* ii (1912) t. 14, f. 9–18 (*not of Hook. f.*). R. Beauverdi *Cockayne in Trans. N.Z. Inst.* xlvi (1914) 64.

North Island: From the East Cape and the Upper Thames Valley southwards, but often local. South Island: Abundant throughout. Stewart Island: Mason Bay, *T. Kirk!* Sea-level to 5500 ft. December–January. Var. *apice-nigra:* Awatere Valley, *T. Kirk!* mountains above the Wairau Gorge, *T. F. C.;* Lake Tennyson, *R. M. Laing.* Otago—Mount Pisa, Kawarau River, St. Bathan's, Sowburn, *Petrie!*

A very variable and almost polymorphic plant, the various forms of which require more attention than has yet been given to them. For the present I place under var. *apice-nigra* a plant taken by Beauverd as *R. Monroi*, but which (as mentioned under that species) certainly does not match Hooker's type. Cockayne has suggested the name of *R. Beauverdi* for it, but he has since independently referred it to var. *apice-nigra.*

19. **R. Monroi** *Hook. f. Handb. N.Z. Fl.* (1864) 148.—Small, prostrate and rooting, much branched, forming small flattened patches; ultimate branchlets erect, leafy, greyish-white. Leaves regularly and closely imbricate, distichous, spreading and recurved, more or less plicate, $\frac{1}{8}$ in. long, narrow linear-elliptic; sheath appressed to the branch, 3–5-nerved; limb subcoriaceous, coated on both surfaces with grey silky tomentum, apex mucronulate. Heads small, narrow, $\frac{1}{6}$ in. long, terminating the branchlets, spreading after flowering. Involucral bracts in 3–4 series, linear-oblong, obtuse or emarginate, the outer tomentose, the inner with scarious tips. Florets about 15, the females the most numerous. Achene puberulous.—*T. Kirk Students' Fl.* (1899) 306; *Cheesem. Man. N.Z. Fl.* (1906) 330; *Ill. N.Z. Fl.* i (1914) t. 102B. R. Cheesemanii *Beauverd in Bull. Bot. Soc. Genève*, ii (1912) t. 14, f. 1–8.

South Island: Not uncommon in dry gravelly and sandy places in Marlborough, Canterbury, and Otago. Sea-level to 3000 ft. November–January.

Easily recognized by the distichous leaves and greyish-white colour, which separate it from all the other species of the genus. It is curious that Hooker does not mention the distichous leaves in his description, for they are distinctly shown in his type specimens. The leaves are correctly represented, however, in my Illustrations (t. 102B). The omission was unfortunate, for it doubtless led Beauverd to describe the true *R. Monroi* as a new species.

20. **R. Haastii** *Hook. f. Handb. N.Z. Fl.* (1864) 148.—Forming large compact green cushions of irregular shape, often 2–3 ft. diam., glabrous or nearly so. Leaves densely imbricated, $\frac{1}{16}$ in. long; sheathing base membranous, much dilated, 3-nerved; lamina or tip rigid, ovate-subulate, erect, more or less coriaceous, flat above, rounded beneath, shortly silky or almost glabrous. Heads small, $\frac{1}{6}$ in. long; involucral bracts in 2–3 series, linear or linear-obovate, hyaline at the tips and obtuse. Florets few, 4–8; about $\frac{1}{2}$ the number female. Achene faintly puberulous. Pappus-hairs copious, slender, not thickened above.—*T. Kirk Students' Fl.* (1899) 302; *Cheesem. Man. N.Z. Fl.* (1906) 330; *Beauverd in Bull. Bot. Soc. Genève*, ii (1910) 224, t. 7.

South Island: Usually in shingly river-valleys. Nelson—Waiau Valley, *Sinclair, W. T. L. Travers;* Amuri, *T. Kirk!* Clarence Valley, *T. F. C.* Canterbury—Kowai River, *Haast;* Upper Waimakariri and its tributaries, *T. Kirk! T. F. C., Cockayne! Foweraker:* Rakaia Valley, abundant, *Cockayne;* Mount Arrowsmith district, *Cockayne* and *R. M. Laing.* Otago—Kyeburn Crossing, Maniototo County, *Petrie!* Mararoa, *Cockayne.* 1000–3500 ft. November–December.

Allied to *R. tenuicaulis*, but easily distinguished by its habit of forming huge cushions of distinct greenish colour, by the shorter leaves with broad bases and ovate-subulate tips, and by the narrow few-flowered heads.

21. **R. tenuicaulis** *Hook. f. Fl. Nov. Zel.* i (1853) 135, t. 36A.—Stems slender, prostrate and creeping, much and laxly branched, 1–10 in. long; branches ascending at the tips. Leaves laxly imbricating, spreading or recurved, $\frac{1}{15}$–$\frac{1}{10}$ in. long, linear-oblong or lanceolate-spathulate, or on luxuriant shoots obovate-spathulate, acuminate or apiculate, concave, more or less clothed with greyish appressed tomentum or almost glabrous. Heads $\frac{1}{8}$–$\frac{1}{6}$ in. long; involucral bracts in 3 series; outer tomentose or glabrate, acute; inner scarious, with brown acute or obtuse tips. Florets from 10 to 16, the females about equalling the hermaphrodite ones in number. Achene glabrate or puberulous. Pappus-hairs copious, very slender.—*Handb. N.Z. Fl.* (1864) 148; *T. Kirk Students' Fl.* (1899) 302; *Cheesem. Man. N.Z. Fl.* (1906) 329; *Beauverd in Bull. Bot. Soc. Genève,* ii (1910) 223.

Var. **pusilla** *T. Kirk Students' Fl.* (1899) 302.—Smaller, glabrous or nearly so, much more closely branched; branches $\frac{1}{5}$–$\frac{1}{2}$ in. high. Leaves $\frac{1}{20}$–$\frac{1}{12}$ in., linear, acute, concave. Female florets almost twice as numerous as the hermaphrodite ones.

North and South Islands: Not uncommon from the Thames goldfields southwards, usually on shingly or sandy river-beds. Var. *pusilla:* Rimutaka Range, *T. Kirk!* mountains flanking the Wairau Valley, *T. F. C.* Sea-level to 5000 ft. December–January.

Easily distinguished by the slender habit, narrow acute or apiculate leaves with greyish tomentum, and brown-tipped involucral bracts.

22. **R. cinerea** *Petrie in Trans. N.Z. Inst.* xlv (1913) 269.—Forming ashy-grey patches several inches in diameter. Stems branched, somewhat woody, prostrate and creeping, sending down numerous long and slender roots; branches short, prostrate or ascending. Leaves closely imbricated, suberect, more or less incurved at the tips, linear-subulate, acuminate, $\frac{1}{8}$–$\frac{1}{5}$ in. long, $\frac{1}{16}$ in. broad, densely clothed on both surfaces with greyish-white floccose tomentum. Heads terminal and solitary, sunk among the uppermost leaves, about $\frac{1}{6}$ in. diam. Involucral bracts in 2–3 series, not exceeding the uppermost leaves, thin and scarious, narrow-lanceolate, yellowish-white, the innermost not white and radiating. Florets about 15–20; pappus-hairs not numerous, slender, not thickened at the tips. Achene glabrous.

South Island: Marlborough—Shingle-slopes in the Upper Awatere Valley, alt. 5000 ft., *Cockayne* and *Mowatt!*

Apparently a very distinct species, with no close allies. The above description is based upon Mr. Petrie's, for the only specimens I have seen are little more than mere scraps.

12. **LEUCOGENES** Beauverd.

Perennial herbs, almost suffruticose towards the base, clothed throughout with silvery-grey or white tomentum. Basal and cauline leaves densely imbricate. Floral leaves larger, spreading in a radiating manner. Heads heterogamous and discoid, usually arranged in a cymose manner. Involucre campanulate; bracts in several series, imbricate, scarious; the outer gradually becoming smaller and woolly on the back. Receptacle almost flat, naked. Corolla of the female flowers tubular, more or less dilated at the top, 4-toothed; of the hermaphrodite regular, narrow-campanulate, 5-fid at the top. Anthers sagittate at the base, with long caudate tails. Style-branches of the hermaphrodite flowers long, curved, compressed, glabrous, subcapitate at the apex and shortly papillose. Achenes fusiform, obscurely 5-angled, densely covered with long setose hairs. Pappus-hairs 20–25, in 1 series, broad, scabrid, papillose towards the top.

A beautiful little genus of 2 or 3 species confined to New Zealand. In habit it much resembles the Eurpoean and Asiatic *Leontopodium*, a montane genus that contains the well-known Swiss edelweiss, but which differs altogether in the structure of the flower-heads. The species of *Leucogenes* have been carefully studied by Beauverd, who points out that they are more closely allied to the section *Psychrophyton* of *Raoulia* than to any other group.

A. Heads in terminal cymes subtended by broad spreading floral leaves much longer than the heads.

Leaves $\frac{1}{3}$–$\frac{3}{4}$ in., linear-oblong, tips erect .. .. .. 1. *L. Leontopodium.*
Leaves $\frac{1}{4}$–$\frac{1}{3}$ in., oblong-spathulate, tips recurved .. .. 2. *L. grandiceps.*

B. Floral leaves small, barely larger than the ordinary leaves.

Leaves $\frac{1}{5}$ in., lanceolate-triangular, appressed .. .. 3. *L.* (?) *Grahami.*

1. **L. Leontopodium** *Beauverd in Bull. Bot. Soc. Genève*, ii (1910) 241.—Stems much branched, decumbent and woody at the base, erect or ascending at the tips, 2–8 in. high. Leaves densely imbricate, erect or rarely patent, $\frac{1}{3}$–$\frac{3}{4}$ in. long, linear-oblong or oblong-lanceolate, acute, clothed on both surfaces with appressed shining silvery tomentum, striate when dry. Peduncles stout, terminating the branches, more or less densely clothed with imbricating bracts. Heads 8–15 together, congested into a dense bracteate glomerule $\frac{1}{2}$–1 in. diam.; each head about $\frac{1}{6}$ in. across; bracts 10–20, spreading, $\frac{1}{4}$–$\frac{3}{4}$ in. long, oblong or ovate-oblong, obtuse or subacute, most densely woolly. Involucral bracts in 2 series, linear-lanceolate, woolly on the back, erect, scarious, shining. Florets numerous; females few, in 1 series. Achene silky. Pappus-hairs few, stout, scabrid, slightly thickened above.—Helichrysum Leontopodium *Hook. f. Fl. Nov. Zel.* i (1853) 141, t. 37B; *T. Kirk Students' Fl.* (1899) 313; *Cheesem. Man. N.Z. Fl.* (1906) 340; *Cockayne Veg. N.Z.* (1921) t. 50, f. 76. Gnaphalium Colensoi *Hook. f. Handb. N.Z. Fl.* (1864) 154.

North Island: Mount Hikurangi (East Cape), *Colenso! Adams* and *Petrie!* Tongariro, *H. Hill!* Hauhungatahi, *Spencer!* Ruapehu, *W. Townson!* Ruahine and Kaimanawa Mountains, *Colenso! Petrie! H. Hill! B. C. Aston!* and others; Tararua Mountains, *Budden, H. H. Travers! B. C. Aston! Petrie!* South Island: Nelson—Ben Nevis, *F. G. Gibbs!* Raglan Range and mountains above the Wairau Gorge, *T. F. C.* Canterbury—Mount Peel, *R. M. Laing!* 4000–6000 ft. January–February.

A beautiful little plant, with precisely the aspect of the edelweiss of the European Alps (*Leontopodium alpinum*), but with flower-heads of different structure.

2. **L. grandiceps** *Beauverd in Bull. Soc. Bot. Genève*, ii (1910) 241.—Densely tufted. Stems much branched, decumbent and woody at the base, 2–8 in. high; branches ascending or erect. Leaves densely imbricate, spreading or recurved, $\frac{1}{4}$–$\frac{1}{3}$ in. long, oblong- or obovate-spathulate, obtuse, flat or concave, clothed on both surfaces with appressed silvery tomentum. Peduncles composed of the elongated tips of the branches, leafy throughout, but the leaves usually not so closely imbricate. Heads congested into a terminal bracteate glomerule surrounded by leafy bracts, as in *L. Leontopodium*, but bracts rather shorter and broader. Involucral bracts in 2 series, linear, tomentose on the back, with brown scarious tips. Florets numerous; females few, in 1 series. Achene silky. Pappus-hairs few, rather stout, thickened above.—Helichrysum grandiceps *Hook. f. Handb. N.Z. Fl.* (1864) 154; *T. Kirk Students' Fl.* (1899) 313; *Cheesem. Man. N.Z. Fl.* (1906) 341; *Ill. N.Z. Fl.* i (1914) t. 105.

South Island: Not uncommon in mountain districts from Nelson to Otago. Stewart Island: Rare. Summits of Mount Anglem and Table Hill, *Cockayne;* Mount Allen, *Murdoch.* 2500–5500 ft. December–January.

L. Leontopodium, which represents *L. grandiceps* in the north of Nelson and on the higher mountains of the North Island, is the only species which can be said to be closely allied. But it can be easily distinguished by the numerous persistent basal leaves, which often form rosettes, and by the longer and more erect cauline leaves.

3. **L.** (?) **Grahami** *Petrie in Trans. N.Z. Inst.* xlv (1913) 268.—Stems numerous from the top of a long stout and woody root, simple or sparingly branched, slender, pliant, $\frac{1}{5}$–$\frac{1}{4}$ in. diam., 4–6 in. long. Leaves closely imbricated, appressed or slightly spreading at the tips, sessile by a broad base, triangular-lanceolate, acute, $\frac{1}{5}$ in. long, everywhere clothed with lax greyish-white cottony tomentum; a few of the floral leaves rather larger than the others, but not exceeding the heads. Heads in capitate fascicles of 2–5, terminal, sessile, each $\frac{1}{10}$ in. diam. Involucral bracts in 3 series, linear-oblong, subacute, pale and shining, scarious, the outer sparingly tomentose on the back. Florets numerous; female in 1 series; corolla abruptly swollen at the base, narrow, slightly dilated above; pappus-hairs few, slender, barbellate, slightly thickened above. Achene sparsely papillose.

South Island: Canterbury—Mount Sebastopol (Mount Cook district), *P. Graham!* February–March.

A very distinct plant. I have only seen one good specimen, and a few scraps, and in default of better material have reproduced Mr. Petrie's description. But the inflorescence, pappus-hairs, and achenes are so different to those of *Leucogenes* that I anticipate that it will ultimately fall into a different genus.

13. **EWARTIA** Beauverd.

Perennial herbs, more or less suffruticose at the base, usually densely clothed with silvery-white pubescence; branches elongated, laxly foliose. Leaves small, alternate, entire, laxly imbricate. Heads small, sessile or peduncled, crowded or solitary at the ends of the branches, terminal, heterogamous and discoid. Involucre oblong or hemispherical; bracts imbricated in 2–3 series, more or less rigid and scarious, furnished with white radiating tips. Receptacle narrow, alveolate, pilose or fimbrillate, naked when old. Florets of the circumference in a single series, female, narrow-tubular, 3–4-toothed. Disc-florets tubular, with a narrow-campanulate limb. Anthers sagittate at the base, produced into fine tails. Style-branches truncate or subcapitate, or of the females linear-filiform. Pappus-hairs in 1 series, slender, shortly barbellate, scaberulous towards the base, clavate-papillose towards the top. Achenes oblong-fusiform, obscurely papillose or puberulose.

A small genus of 5 species, 4 confined to Australia, the remaining 1 endemic in New Zealand. The species have been placed by botanists in turns in *Gnaphalium*, *Helichrysum*, *Raoulia*, *Antennaria*, and *Leontopodium*. Such a complete want of unanimity is probably the best proof that could be offered of the desirability of establishing a separate genus for their reception, and most New Zealand botanists will agree with Beauverd's action.

1. **E. Sinclairii** *Cheesem. n. comb.*—A small much-branched herb 6–12 in. high; stems and branches ascending, leafy, clothed throughout with white cottony tomentum. Leaves close-set or laxly spreading, $\frac{1}{4}$–$\frac{1}{3}$ in. long, $\frac{1}{6}$ in. broad, linear-oblong to obovate-spathulate, obtuse, densely covered with white cottony tomentum on both surfaces. Heads

¼ in. diam., arranged in numerous rounded terminal dense corymbs ½–1 in. across; peduncles and pedicels short, densely cottony; outer scales of the involucre cottony, inner shortly radiating; female florets in 1 series; pappus-hairs rather slender, clavate-papillose towards the apex, scaberulous towards the base. Achenes fusiform, glabrous or faintly puberulous.—Helichrysum Sinclairii *Hook. f. Handb. N.Z. Fl.* (1864) 15; *T. Kirk Students' Fl.* (1899) 309; *Cheesem. Man. N.Z. Fl.* (1906) 339.

South Island: Marlborough—Upper Awatere Valley, *Sinclair* (Handbook); base of Shingly Range, *Cockayne! Foweraker!* 3000–4000 ft.

Apparently a rare and local plant. Hooker compares it with the Tasmanian *Raoulia catipes* (Hook. f. Fl. Tasm. i (1860) 206, t. 58), but states that the leaves are smaller, the heads not ½ the size, and much more numerous. *R. catipes* has been selected by Beauverd as the type of his genus *Ewartia;* and the structure of the flower-heads of *E. Sinclairii* corresponds with that of *E. catipes* in all essential points.

*Helichrysum Foweraker*i Cockayne in Trans. N.Z. Inst. xlviii (1916) 196 is a species based upon a single specimen collected by Cockayne and Foweraker at Robinson Creek, inland Kaikoura Mountains. It has the habit and appearance of *Ewartia Sinclairii* and the inflorescence of *Helichrysum bellidioides;* and, as suggested by Cockayne, is probably a hybrid between the two plants.

nom. cons. K. Bull. 1940: 122.

14. **HELICHRYSUM** Vaill. 1727 1907

Herbs or small shrubs, very variable in habit, often woolly or tomentose. Leaves alternate or the lower rarely opposite, quite entire. Heads solitary or corymbose, heterogamous and discoid or homogamous through the suppression of the female florets. Involucre from cylindrical to broadly hemispherical; bracts in several series, with or without white or coloured spreading petal-like scarious tips. Receptacle flat or convex, naked or pitted. Female florets exterior, few, sometimes altogether wanting, filiform, minutely 2–3-toothed. Disc-florets hermaphrodite, numerous, tubular with a funnel-shaped 5-toothed mouth. Anthers sagittate at the base, produced into fine tails. Style-branches of the disc-florets almost terete, truncate or subcapitate. Achenes small, terete, 5-angled or compressed. Pappus-hairs in 1 series (rarely in several series), free or connate below, simple or barbellate or plumose above.

A very large and heteromorphous genus, probably containing more than 350 species, found in most parts of the world, and especially plentiful in South Africa and Australia. It has been united with *Gnaphalium* by many authors, but can usually be distinguished by the hermaphrodite florets being always much more numerous than the female ones. All the New Zealand species are endemic.

A. Xerochlaena. *Herbs. Involucre broad, hemispherical, the outer bracts broad, sessile, passing gradually into the inner ones, which have linear claws and white (or coloured) radiating tips. (The white tips are wanting in* H. filicaule.)

Stems 6–18 in., slender, prostrate. Leaves glabrous above. Heads solitary, large, ½–¾ in. diam.	1. *H. bellidioides.*
Stems 12–24 in., slender, prostrate. Leaves glabrous above. Heads corymbose, ¼ in. diam.	2. *H. Purdiei.*
Stems 3–10 in., filiform, erect. Leaves glabrous above. Heads solitary, ¼–⅓ in.; involucral bracts without white radiating tips	3. *H. filicaule.*

B. Ozothamnus. *Shrubs, often of small size. Heads small, cymose or solitary. Involucral bracts not white or radiating, or very obscurely so.*

* Heads in corymbose cymes.

Leaves ovate or orbicular, petiolate	4. *H. glomeratum.*
Leaves lanceolate, petiolate	5. *H. lanceolatum.*

H. bellidioides × prostrata Trans: 57: 1926: 70

** Heads solitary. Leaves densely imbricate, closely appressed to the branch.

Branches slender. Leaves in several series, $\frac{1}{6}$ in., oblong, silvery on both surfaces	6. *H. (?) pauciflorum.*
Branchlets slender. Leaves in about 6 series, $\frac{1}{12}$–$\frac{1}{10}$ in., linear, silky or hoary	7. *H. depressum.*
Scrambling or scandent; branchlets very slender. Leaves polymorphous, $\frac{1}{6}$–$\frac{1}{3}$ in., oblong to lanceolate. Heads small, $\frac{1}{6}$–$\frac{1}{5}$ in.	8. *H. (?) dimorphum.*
Branchlets $\frac{1}{12}$–$\frac{1}{8}$ in. Leaves in about 4 series, $\frac{1}{16}$–$\frac{1}{12}$ in., polished and keeled on the back	9. *H. microphyllum.*
Branchlets $\frac{1}{8}$–$\frac{1}{6}$ in. Leaves in about 6 series, $\frac{1}{10}$–$\frac{1}{6}$ in., polished and keeled on the back	10. *H. Selago.*
Branchlets stout, $\frac{1}{3}$ in. Leaves in many series, $\frac{1}{5}$–$\frac{1}{4}$ in., polished and convex on the back..	11. *H. coralloides.*

(not f.)

1. **H. bellidioides** *Willd. Sp. Plant.* iii (1800) 1911.—Stems slender, prostrate, much branched, almost woody at the base, 6–18 in. long; branches numerous, erect or ascending, leafy. Leaves loosely imbricate or almost distant, spreading or recurved, $\frac{1}{4}$–$\frac{1}{2}$ in. long, obovate-spathulate or obovate-oblong, obtuse or apiculate, flat, 1-nerved, upper surface slightly cottony or glabrous, beneath clothed with cottony appressed tomentum. Heads solitary, $\frac{1}{2}$ in. diam. or more, on bracteate cottony peduncles 1–5 in. long terminating the branches; involucral bracts in many series, linear-ligulate, $\frac{1}{4}$–$\frac{1}{3}$ in. long, with scarious tomentose claws and long white radiating tips. Receptacle convex or almost conical. Florets very numerous; females few, in 1 or 2 series. Achene glabrous, with a thickened areole at the base. Pappus-hairs few, slender.—*A. Cunn. Precur.* (1838) n. 449; *Raoul Choix* (1846) 45; *T. Kirk Students' Fl.* (1899) 308; *Cheesem. Man. N.Z. Fl.* (1906) 337; *Subantarct. Is. N.Z.* ii (1909) 415. Gnaphalium bellidioides *Hook. f. Fl. Nov. Zel.* i (1853) 137; *Handb. N.Z. Fl.* (1864) 152. Xeranthemum bellidioides *Forst. f. Prodr.* (1786) 55; *A. Rich. Fl. Nouv. Zel.* (1832) 242.

Var. **prostratum** *T. Kirk Students' Fl.* (1899) 309.—Similar to the type, but heads sessile at the tips of the branches.—H. prostratum *Hook. f. Fl. Antarct.* i (1844) 30, t. 21. Gnaphalium prostratum *Hook. f. Fl. Nov. Zel.* i (1853) 137; *Handb. N.Z. Fl.* (1864) 152. see Trans 57: 1926: 70.

North and South Islands, Chatham Islands, Stewart Island, Auckland and Campbell Islands, Antipodes Island: Abundant in mountain districts from the East Cape, Mount Egmont, and Taupo southwards. Sea-level to 5000 ft. November–February. Var. *prostratum:* Sparingly found in both North and South Islands, more abundant in the Auckland and Campbell Islands.

A common plant. I quite agree with Mr. Kirk in considering *H. prostratum* to be a variety only, and there is no difficulty in collecting passage-forms from no peduncles to very long bracteate ones. But I do not find the conical receptacle to be peculiar to var. *prostratum.*

see Trans 57: 1926: 55

2. **H. Purdiei** *Petrie in Trans. N.Z. Inst.* xxii (1890) 440.—Stems slender, wiry, prostrate, spreading, much branched, woody at the base, 1–2 ft. long; branches white and tomentose at the tips. Leaves distant, spreading, $\frac{1}{4}$–$\frac{1}{2}$ in. long, obovate-spathulate, rounded at the tip and minutely apiculate, flat, rather membranous, pubescent or almost glabrous above, beneath clothed with laxly appressed greyish-white tomentum. Heads $\frac{1}{4}$ in. diam., in corymbs of 3 to 6 terminating the branchlets; peduncles and pedicels short, slender, tomentose. Involucral bracts in several series; the outer very short, obtuse, brown and scarious; the inner linear-oblong

Ewartia sinclairii × Helichrysum bellid (= H. forsteri s.t.). upper Dee River

with short white radiating tips. Florets very numerous; females few, in 1–2 series. Achene glabrous, with a thickened areole at the base. Pappus-hairs few, slender, barbellate above.—*T. Kirk Students' Fl.* (1899) 309; *Cheesem. Man. N.Z. Fl.* (1906) 338.

South Island: Nelson—Banks of the River Percival, Hanmer, in company with *H. bellidioides* and *H. glomeratum*, *C. E. Christensen!* Otago—West side of Dunedin Harbour, between Ravensbourne and Port Chalmers, *A. C. Purdie! Petrie! B. C. Aston! Cockayne!* Sea-level to 1500 ft. November–December.

A very puzzling species, not very closely allied to any other.

3. **H. filicaule** *Hook. f. Fl. Nov. Zel.* i (1853) 140, t. 36B.—Rhizome long, wiry, creeping, putting up numerous very slender simple or rarely branched erect cottony stems 3–10 in. high. Leaves distant, $\frac{1}{4}$–$\frac{1}{3}$ in. long, obovate-oblong or narrow-oblong, obtuse or apiculate, glabrous or slightly cottony above, beneath clothed with white cottony tomentum. Heads solitary, terminal on long filiform peduncles, $\frac{1}{3}$ in. diam.; involucral bracts in about 4 series; the outer shorter, oblong, obtuse, cottony at the base; inner longer, linear-oblong or linear, acute, scarious. Receptacle small, convex. Florets numerous; females few, in 1 series. Achene obscurely papillose or puberulous. Pappus-hairs very slender.—*T. Kirk Students' Fl.* (1899) 309; *Cheesem. Man. N.Z. Fl.* (1906) 338. Gnaphalium filicaule *Hook. f. Handb. N.Z. Fl.* (1864) 153.

North and South Islands, Chatham Islands, Stewart Island: Not uncommon in dry grassy places from Rotorua southwards. Sea-level to 4000 ft. December–February.

(Raoul.) Hooker. S. 1844–120.

4. **H. glomeratum** *Benth. and Hook. f. Gen. Plant.* ii (1873) 311.—A much-branched shrub 3–8 ft. high; branches spreading, slender, flexuous, grooved, tomentose above. Leaves alternate, very variable in size, $\frac{1}{4}$–$1\frac{1}{2}$ in. long, orbicular or broadly ovate or ovate-spathulate, obtuse or minutely apiculate, suddenly narrowed into a short slender petiole, quite entire, flat; upper surface glabrous, minutely reticulate; beneath clothed with white cottony tomentum. Heads in terminal or lateral sessile or stalked subglobose corymbs, small, $\frac{1}{10}$ in. diam. Involucral bracts few, in about 3 series, oblong, obtuse, scarious, woolly at the base. Florets 8–12, 2 or 3 of them female. Achene puberulous, with a thickened areole at the base. Pappus-hairs thickened at the tips.—*T. Kirk Students' Fl.* (1899) 311; *Cheesem. Man. N.Z. Fl.* (1906) 341. Ozothamnus glomeratus *Hook. f. Fl. Nov. Zel.* i (1853) 133; *Handb. N.Z. Fl.* (1864) 146. Swammerdammia glomerata *Raoul Choix* (1846) 20, t. 16.

1844 : 120 (Ann. Sc. Nat. Ser iii).

North and South Islands: Not uncommon from the North Cape southwards. Sea-level to 3000 ft. November–January.

A remarkably distinct plant, easily recognized by the orbicular or broadly ovate lamina of the leaf with its broad flat petiole.

(Banks)

5. **H. lanceolatum** *T. Kirk Students' Fl.* (1899) 311.—Altogether similar to *H. glomeratum*, but leaves 1–$1\frac{1}{2}$ in. long, lanceolate or elliptic-lanceolate, acute or subacute, narrowed into a short winged petiole, glabrous above, beneath clothed with white appressed tomentum; margins flat or slightly undulate. Heads, florets, and achenes precisely as in *H. glomeratum.*—*Cheesem. Man. N.Z. Fl.* (1906) 342. Ozothamnus lanceolatus *Buch. in Trans. N.Z. Inst.* ii (1870) 88.

NORTH ISLAND: Mountains near Hokianga, *Buchanan!* 2000 ft.

Probably only a narrow-leaved variety of the preceding. I have seen no specimens except Mr. Buchanan's.

6. **H.** (?) **pauciflorum** *T. Kirk in Trans. N.Z. Inst.* xxvii (1895) 351.—A small much-branched greyish-white plant, with a hard and woody base. Stems 3–8 in. high, decumbent below, erect or ascending at the tips; branches stout, with the leaves $\frac{1}{4}$–$\frac{1}{3}$ in. diam. Leaves densely imbricate in several series, $\frac{1}{6}$ in. long, oblong or oblong-spathulate, obtuse or subacute, erect or spreading at the tips, sessile by a broad base, both surfaces densely clothed with greyish-white tomentum. Heads $\frac{1}{6}$ in. diam., solitary, sessile at the tips of the branches and almost hidden by the leaves; involucral bracts in 2 series, lanceolate, acute, scarious, silky at the base on the outside. Florets few, 10–16, of which 3–6 are females. Achene clothed with long silky hairs, and with a thickened areole at the base. Pappus-hairs few, thickened upwards.—*Students' Fl.* (1899) 313; *Cheesem. Man. N.Z. Fl.* (1906) 344.

SOUTH ISLAND: Canterbury—Craigieburn Mountains, *Cockayne! Petrie!* Candlestick Mountains, *Cockayne!* 3000–5000 ft. January–February.

A curious species, with a close superficial likeness to *Leucogenes grandiceps*, but wanting the woolly bracts of that species. The pappus-hairs are those of the *Psychrophyton* section of *Raoulia*, with which it also agrees in the hispid achenes, and I should have transferred it to *Raoulia* but for the very different habit.

7. **H. depressum** *Benth. and Hook. f. Gen. Plant.* ii (1873) 311.—A suberect or rarely prostrate much-branched bush 1–5 ft. high, hoary in all its parts with appressed greyish-white tomentum; branches spreading, rigid and wiry, often tortuous. Leaves minute, closely appressed to the branch, laxly imbricating, $\frac{1}{12}$–$\frac{1}{10}$ in. long, linear, obtuse, concave and loosely woolly on the inner face, silky or woolly on the back. Heads small, $\frac{1}{6}$ in. diam., solitary, sessile at the tips of the branchlets; involucral bracts few, linear, scarious, acute or acuminate, rarely obtuse, glabrate or cottony at the base. Florets 8–12; females few, 2–3. Achene glabrous or puberulous. Pappus-hairs in several series, copious, slender.—*T. Kirk Students' Fl.* (1899) 311; *Cheesem. Man. N.Z. Fl.* (1906) 342. Ozothamnus depressus *Hook. f. Fl. Nov. Zel.* i (1853) 134, t. 35B; *Handb. N.Z. Fl.* (1864) 146.

NORTH ISLAND: Shingly bed of the Tukituki River, Hawke's Bay. *Petrie!* SOUTH ISLAND: Not uncommon throughout, usually in shingly river-beds. 1000–4500 ft. December–February.

Easily recognized by its dead-looking appearance and minute appressed leaves.

8. **H.** (?) **dimorphum** *Cockayne in Trans. N.Z. Inst.* xlvii (1915) 117.—A scrambling bush 5–8 ft. high. Stems stout and sparingly branched at the base, often $\frac{3}{4}$ in. in circumference, densely and compactly branched towards the top; ultimate branchlets very slender. Leaves of young plants (also present in adults where shaded) elliptic or elliptic-oblong, $\frac{1}{6}$–$\frac{1}{4}$ in. long, spreading or deflexed, glabrous and distinctly nerved above, densely clothed with soft white tomentum beneath, acute at the apex, margins thickened and recurved. Leaves of adult plants closely appressed, scale-like, linear-lanceolate, $\frac{1}{8}$–$\frac{1}{6}$ in. long, obtuse or subacute, concave above, more or less clothed with silky-white tomentum, upper surface more or less silky-tomentose. Heads solitary and terminal, small, $\frac{1}{6}$–$\frac{1}{5}$ in.

long, cylindric. Involucral scales in many series; outer broadly oblong or obovate, tomentose on the back; inner oblong or linear-oblong, scariose, brownish at the top. Florets 15–25, only seen in an immature state, but apparently all hermaphrodite. Pappus-hairs numerous, slender, slightly thickened towards the tip and papillose, smooth at the base. Achenes oblong, glabrous.

South Island: Canterbury—Waimakariri River basin, scrub by the Poulter River, and at Puffer's Creek, 2500 ft., *Cockayne!*

Apparently rare and local, and only known from the two localities quoted above. Its subscandent habit is peculiar, and unique in the genus. But the few flower-heads that I have had an opportunity of dissecting are very immature; and the plant may not belong to *Helichrysum*.

9. **H. microphyllum** *Benth. and Hook. f. Gen. Plant.* ii (1873) 311.—A small excessively branched shrub 6–36 in. high. Stems stout, gnarled and twisted; ultimate branchlets very slender, closely packed, $\frac{1}{20}$–$\frac{1}{16}$ in. diam., more or less tomentose, irregularly tetragonous. Leaves embedded in white wool, minute, $\frac{1}{20}$ in. long, ovate-oblong, obtuse or subacute, thick and coriaceous, concave and densely woolly on the inner face, green and polished and more or less keeled on the back. Heads terminal, solitary, sessile, turbinate, $\frac{1}{5}$ in. diam.; involucral bracts in 2–3 series, linear-oblong, obtuse, scarious. Florets 20–25, yellow; females in 1 series, few. Achene pubescent. Pappus-hairs not thickened at the tip.—*T. Kirk Students' Fl.* (1899) 312; *Cheesem. Man. N.Z. Fl.* (1906) 342. Ozothamnus microphyllus *Hook. f. Fl. Nov. Zel.* i (1853) 134, t. 35A; *Handb. N.Z. Fl.* (1864) 146.

South Island: Rocky places in the mountains of Marlborough, Nelson, and North Canterbury, not uncommon. 1500–4000 ft. February–March.

This is the species as originally described and figured by Hooker in the "Flora Novae-Zelandiae." In the Handbook and in all later publications (including my own Manual) the conception of the species was enlarged to include several stouter forms intermediate in character between *H. microphyllum* and *H. Selago*. I now agree with Dr. Cockayne (Trans. N.Z. Inst. xlv (1913) 255) in including these in *H. Selago*!

10. **H. Selago** *Benth. and Hook. f. Gen. Plant.* ii (1873) 311.—A small much-branched shrub 6–15 in. high; branchlets stout, crowded, with the leaves $\frac{1}{8}$–$\frac{1}{6}$ in. diam. Leaves minute, closely appressed to the branch, densely imbricating in about 5 or 6 series, $\frac{1}{10}$–$\frac{1}{8}$ in. long, ovate-triangular, obtuse or subacute, thick and coriaceous in the upper part, membranous below, concave and woolly on the inner face, polished and obtusely keeled on the back. Heads terminal, solitary, sessile, $\frac{1}{4}$ in. diam.; involucral bracts in 3 series, linear-oblong; the outer obtuse, tomentose at the base; the inner subacute, coriaceous below, with short scarious spreading tips. Florets 35–45; females few, in 1 series. Achene puberulous. Pappus-hairs few, not thickened at the tips.—*T. Kirk Students' Fl.* (1899) 312; *Cheesem. Man. N.Z. Fl.* (1906) 343. Ozothamnus Selago *Hook. f. Fl. Nov. Zel.* ii (1855) 332; *Handb. N.Z. Fl.* (1864) 147.

Var. **tuberculata** *Cheesem. n. var.*—Leaves almost hidden by white tomentum, the centre of the leaf alone showing as a polished tubercle.

Var. **acuta** *Cheesem. n. var.*—Leaves curved, decidedly acute or even apiculate. Of this there seems to be two forms—*a*, with the leaves in many series and almost glabrous; and *b*, with the leaves woolly as in the type, and usually quadrifarious.

H. plumeum All. 76: 594
= H. selago var. tomentosum.

H. selago var. acuta cheesem.

Var. **tumida** *Cheesem. n. var.* — Branchlets stout, almost matching those of *H. coralloides.* See Trans 72: 36.

Var. **tomentosum** *Cheesem. Man. N.Z. Fl.* (1906) 343.—Leaves oblong, subacute, almost altogether concealed by fulvous tomentum. Heads not seen. Probably a distinct species.

South Island: Not uncommon in mountain districts from Nelson to Foveaux Strait. 2000–4500 ft. December–January. Var. *tuberculata:* Wairau Gorge, Nelson, alt. 3000 ft., *T. F. C., Cockayne!* Var. *acuta:* Mountains behind the Hanmer Plains, *T. F. C., C. E. Christensen!* Var. *tumida:* Near Cape Saunders, Otago, *Cockayne!* Var. *tomentosum:* Mount Dobson, *T. F. C.*, alt. 5000 ft.

An exceedingly variable plant. Dr. Cockayne has kindly forwarded a series of some 5 or 6 supposed varieties, 3 of which I have briefly characterized above. The remainder require more study with larger suites of specimens than have hitherto been obtained.

(46K) 72(1943) 326

11. **H. coralloides** *Benth. and Hook. f. Gen. Plant.* ii (1873) 311.—A short stout much-branched shrub 4–48 in. high, hard and woody below; branches spreading, cylindrical, $\frac{1}{3}$ in. diam., densely tomentose between the leaves, which resemble tubercles on their surface. Leaves closely appressed to the branch, imbricated in many series, $\frac{1}{5}$–$\frac{1}{4}$ in. long, oblong, obtuse, very thick and coriaceous towards the tip, membranous below, inner face concave and densely clothed with long woolly tomentum, back convex or obscurely keeled, glabrous and polished. Heads $\frac{1}{3}$–$\frac{1}{2}$ in. diam., terminal, solitary, sunk amongst the uppermost leaves; involucral bracts in about 3 series, linear-oblong, rigid and cartilaginous at the base; tips thinner, scarious, often recurved. Florets numerous; female few, in one series. Achene pubescent. Pappus-hairs few, stout, slightly thickened above.—*T. Kirk Students' Fl.* (1899) 312; *Cheesem. Man. N.Z. Fl.* (1906) 343; *Cockayne Veg. N.Z.* (1921) tt. 53, 54. Ozothamnus coralloides *Hook. f. Fl. Nov. Zel.* ii (1855) 332; *Handb. N.Z. Fl.* (1864) 147.

South Island: Marlborough—Kaikoura Mountains, *Monro, Buchanan!* Upper Awatere, *Sinclair! Cockayne!* Medway Creek, *T. Kirk!* Palmer River, *Cockayne.* Nelson—Western slopes of Mount Percival, *T. F. C.* 3000–5000 ft.

A very remarkable plant. In its ordinary state the leaves resemble glossy tubercles closely set along the branches; but those of the juvenile plant are altogether different, and are open and spreading. Under suitable conditions, these juvenile leaves may be occasionally seen on "reversion shoots" on adult plants, just as is the case in certain species of *Veronica.*

15. CASSINIA R. Br. 1817

Shrubs or very rarely herbs. Leaves alternate, entire. Heads small, numerous, in terminal corymbs or panicles, discoid, homogamous in most of the species, but usually heterogamous in those found in New Zealand. Involucre oblong or ovoid; bracts in several series, imbricate, scarious; the inner with short white radiating tips. Receptacle narrow, with scarious chaffy scales among the florets. Florets few, in the majority of the species all hermaphrodite, tubular, 5-toothed; but in the New Zealand species 1 or 2 of the outer ones are female, filiform, minutely toothed. Anthers sagittate at the base, usually produced into slender tails. Style-branches of the hermaphrodite florets terete, truncate. Achenes small, angled ar almost terete. Pappus-hairs in 1 series, slender, free or connate at the base.

A small genus of about 20 species, confined to Australia, New Zealand, and South Africa. The New Zealand species are all endemic, and with 1 or 2 from South Africa constitute the subgenus *Rhynea*, characterized by the inner involucral bracts having short white radiating tips, and by the heads usually having 1 or 2 female florets. The species are very closely allied, and are by no means easy to discriminate.

T. 57: 47.

C. amoenetorta Leaves 65:514

* Receptacle with numerous scales among the florets.

Leaves $\frac{1}{8}$–$\frac{1}{5}$ in., linear-obovate, white beneath	1. *C. retorta.*
Leaves $\frac{1}{12}$–$\frac{1}{8}$ in., linear or linear-spathulate, white or yellowish beneath	2. *C. leptophylla.*
Leaves $\frac{1}{4}$–$\frac{1}{3}$ in., linear-obovate or linear-oblong, glutinous, fulvous or whitish beneath	3. *C. Vauvilliersii.*

** Receptacle with few or no scales among the florets.

Leaves $\frac{1}{4}$–$\frac{2}{3}$ in., linear-spathulate, white beneath	4. *C. amoena.*
Leaves $\frac{1}{6}$–$\frac{1}{3}$ in., linear or narrow linear-spathulate, glutinous, fulvous beneath	5. *C. fulvida.*

1. **C. retorta** *A. Cunn. ex DC. Prodr.* vi (1837) 154.—A much or sparingly branched heath-like shrub 4–15 ft. high; branches stout, spreading, clothed with white tomentum. Leaves numerous, small, crowded, spreading and recurved, $\frac{1}{8}$–$\frac{1}{5}$ in. long, linear-obovate or linear-oblong or oblong-obovate, obtuse, narrowed into a very short petiole, coriaceous, glabrous or hoary above, beneath clothed with dense white tomentum; margins recurved. Heads numerous, in small terminal corymbs, shortly pedicelled, turbinate, $\frac{1}{4}$ in. long; involucral bracts in several series; the outer shorter, ovate-oblong, tomentose; inner linear-oblong, with short white obtuse radiating tips. Receptacle with many white-tipped scales similar to the inner involucral bracts. Florets 6–20. Achenes glabrous, striate. Pappus-hairs slender.—*Hook. f. Fl. Nov. Zel.* i (1853) 345; *Handb. N.Z. Fl.* (1864) 145; *T. Kirk Students' Fl.* (1899) 314; *Cheesem. Man. N.Z. Fl.* (1906) 345.

North Island: Common as far south as the East Cape, usually near the coast, on sand-dunes, &c. November–February.

(Forst. f.)

2. **C. leptophylla** *R. Br. in Trans. Linn. Soc.* xii (1817) 126.—Much like *C. retorta* in habit and general appearance, but branches more slender. Leaves smaller, crowded, erect or spreading or recurved, $\frac{1}{12}$–$\frac{1}{8}$ in. long, narrow-linear or linear-spathulate, obtuse, coriaceous, glabrous above, clothed with white or yellowish tomentum beneath; margins recurved. Heads numerous, in small terminal corymbs, very shortly pedicelled, narrow-turbinate, $\frac{1}{6}$ in. long; involucral bracts in several series; the outer broader and shorter, glabrous or nearly so; inner linear, obtuse, with short white radiating tips. Receptacle with white-tipped scales subtending the florets. Florets 6–12. Achene and pappus as in *C. retorta.*—*A. Cunn. Precur.* (1838) n. 447 (*in part*); *Raoul Choix* (1846) 45; *Hook. f. Fl. Nov. Zel.* i (1853) 132; *Handb. N.Z. Fl.* (1864) 145; *T. Kirk Students' Fl.* (1899) 314; *Cheesem. Man. N.Z. Fl.* (1906) 345. C. spathulata *Col. in Trans. N.Z. Inst.* xxii (1890) 472. Calea leptophylla *Forst. f. Prodr.* (1786) 55.

North and South Islands: Not uncommon from the East Cape southwards to Marlborough and Nelson. *Tauhinu-korokio; Cottonwood.* December–February.

Very close to the preceding, but differing in the more slender habit, smaller and narrower leaves, and smaller and narrower glabrate heads. Mr. Colenso's *C. spathulata* does not seem to me to be even entitled to varietal rank.

(Hook. et Arn.)

3. **C. Vauvilliersii** *Hook. f. Fl. Nov. Zel.* i (1853) 133.—An erect closely branched shrub 2–6 ft. high; branches stout, erect or spreading, often glutinous, grooved, and with the leaves beneath densely clothed with fulvous or whitish tomentum. Leaves numerous, close-set, erect or spreading, $\frac{1}{4}$–$\frac{1}{3}$ in. long or more, linear-obovate or linear-oblong, obtuse, narrowed into a short broad petiole or sessile, coriaceous, glabrous and usually glutinous

above, fulvous or white and strongly costate beneath; margins recurved. Heads very numerous, in terminal rounded corymbs, shortly pedicelled, turbinate, $\frac{1}{5}$–$\frac{1}{4}$ in. long; involucral bracts in several series; the outer shorter, ovate-oblong, obtuse or subacute, tomentose or glabrate, often reddish towards the tips; inner linear-oblong, with short white obtuse radiating tips. Scales among the florets numerous. Florets 8–15. Pappus-hairs thickened at the tips.—*Handb. N.Z. Fl.* (1864) 145; *T. Kirk Students' Fl.* (1899) 315; *Cheesem. Man. N.Z. Fl.* (1906) 345. Ozothamnus Vauvilliersii *Homb. et Jacq. Bot. Voy. Astrol. et Zèl.* (1846) 38, f. 5; *Hook. f. Fl. Antarct.* i (1844) 29. Olearia xanthophylla *Col. in. Trans. N.Z. Inst.* xx (1888) 193.

(a) Var. **rubra.**—Involucral bracts red, glabrous.—C. rubra *Buch. in Trans. N.Z. Inst.* xix (1887) 216; *T. Kirk Students' Fl.* (1899) 315.

(b) Var. **albida** *T. Kirk l.c.*—Branchlets and leaves beneath clothed with whitish tomentum. Leaves linear-spathulate, strongly costate beneath. C. albida *Cockayne in Trans. N.Z. Inst.* xxviii (1896) 374.

North and South Islands, Stewart Island, Auckland Islands: Not uncommon from the East Cape and Taupo southwards. Sea-level to 4500 ft. December–January. Var. *rubra:* Upper Wanganui River, *Buchanan!* Var. *albida:* Marlborough—Kaikoura Mountains, extending in a westerly direction to the Clarence River and Lake Tennyson, and northwards to the middle portion of the Wairau Valley.

A very variable plant. I am unable to maintain Buchanan's *C. rubra* as a distinct species. Var. *albida* has more important points of difference, and at one time I was inclined to agree with Dr. Cockayne in definitely separating if from *C. Vauvilliersii*. More recent study has led me to take the opposite view. And if I rightly understand Dr. Cockayne's remarks in Trans. N.Z. Inst. l (1918) 168, he also is inclined to reduce it to the position of a variety.

4. **C. amoena** *Cheesem. in Trans. N.Z. Inst.* xxix (1897) 391.—A small round-topped densely branched shrub 1–2 ft. high; branches stout, furrowed, the younger ones clothed with greyish-white tomentum. Leaves close-set, spreading or suberect, $\frac{1}{4}$–$\frac{2}{3}$ in. long, narrow linear-obovate or linear-spathulate, obtuse, narrowed into a short petiole, coriaceous, glabrous above, clothed with dense white tomentum beneath; margins recurved. Heads numerous, in rounded terminal corymbs, narrow-turbinate, shortly pedicelled, $\frac{1}{5}$–$\frac{1}{4}$ in. long; involucral bracts in several series; the outer shorter, ovate-oblong, obtuse, tomentose; the inner linear-oblong, with short white radiating tips. Florets few, 4–6; scales of the receptacle usually absent or rarely 1 or 2 present. Achene silky, with a thickened areole at the base. Pappus-hairs thickened at the tips.—*T. Kirk Students' Fl.* (1899) 315; *Cheesem. Man. N.Z. Fl.* (1906) 346; *Ill. N.Z. Fl.* i (1914) t. 107.

North Island: Cliffs near the North Cape, *T. F. C., W. R. B. Oliver!* December–January.

Closely allied to *C. Vauvilliersii*, some forms of which approach it in habit. It can easily be distinguished, however, by the smaller size, narrower heads, fewer florets (usually from 4–6), and particularly by the almost total absence of scales among the florets. *C. retorta* and *C. leptophylla* are at once separated by the different habit and much larger size, smaller leaves, broader heads with more numerous florets, and by the numerous receptacular scales.

5. **C. fulvida** *Hook. f. Handb. N.Z. Fl.* (1864) 145.—A slender erect much-branched shrub 2–6 ft. high; branches glutinous, clothed with fulvous tomentum. Leaves close-set, spreading or suberect, $\frac{1}{6}$–$\frac{1}{3}$ in. long, linear or narrow linear-spathulate or linear-obovate, obtuse, narrowed to

the base, coriaceous, glabrous and subviscid above, beneath clothed with fulvous tomentum; margins recurved. Heads very numerous, in terminal rounded corymbs, shortly pedicelled, cylindrical, $\frac{1}{5}$ in. long; involucral bracts few, in several series; outer shorter, pubescent or glabrate; inner with short white radiating tips. Scales among the florets wanting or 1 or 2 only. Florets few, 5–8. Achene pubescent. Pappus-hairs few, thickened above.—*T. Kirk Students' Fl.* (1899) 316; *Cheesem. Man. N.Z. Fl.* (1906) 346. C. leptophylla *var.* γ *Hook. f. Fl. Nov. Zel.* i (1853) 133.

Var. **linearis** *T. Kirk l.c.*—Leaves rather distant, $\frac{1}{4}$–$\frac{1}{2}$ in. long, very narrow, narrow-linear or linear-lanceolate, clothed with white tomentum beneath. Florets 4–6.

North and South Islands, Stewart Island: Not uncommon from Opotiki and Rotorua southwards. Sea-level to 3500 ft. December–February. Var. *linearis:* Near Dunedin, *B. C. Aston! H. J. Matthews!*

Very close to some forms of *C. leptophylla*, and only to be distinguished by the more fulvous viscid tomentum, fewer florets, and by the paucity or total absence of the scales among the florets.

16. **CRASPEDIA** Forst.

Perennial herbs, usually more or less silky or woolly, rarely almost glabrous. Leaves radical or alternate, entire. Heads homogamous and discoid, small, numerous, sessile or nearly so, crowded together into a dense globose or ovoid glomerule or compound head, which is surrounded by scarious bracts forming a general involucre. Involucre of the partial heads of several scarious hyaline bracts, without radiating tips. Receptacle small, with hyaline scales similar to the involucral bracts at the base of each floret. Florets 3–8, all hermaphrodite, tubular with a campanulate 5-toothed limb. Anthers sagittate at the base, more or less distinctly tailed. Style-branches almost terete, truncate at the tip. Achenes small, compressed, silky. Pappus-hairs in 1 series, plumose, free or connate at the base.

A small genus of 5 or 6 species, confined to New Zealand, Australia, and Tasmania. The New Zealand species has the range of the genus.

1. **C. uniflora** *Forst. f. Prodr.* (1786) 58.—A very variable stout or slender unbranched herb 4–20 in. high, silky, cottony or woolly, or nearly glabrous. Leaves nearly all radical, 1–8 in. long, obovate-oblong to spathulate or spathulate-lanceolate, obtuse, narrowed into a short broad petiole, usually but not always fringed with white tomentum, often slightly viscid; cauline leaves smaller and narrower, the upper reduced to distant bracts. Compound head or glomerule solitary, terminal, $\frac{1}{4}$–2 in. diam., globose or nearly so; bracts 4–10, ovate, herbaceous with a scarious margin, shorter than the head. Partial heads 3–8-flowered; involucral bracts oblong or linear-oblong, thin and hyaline. Achene silky. Pappus-hairs plumose, as long as the florets.—*A. Rich. Fl. Nouv. Zel.* (1832) 245; *A. Cunn. Precur.* (1838) n. 446; *Raoul Choix* (1846) 45; *T. Kirk Students' Fl.* (1899) 316; *Cheesem. Man. N.Z. Fl.* (1906) 347. C. fimbriata *DC. Prodr.* vi (1837) 152; *Hook. f. Fl. Nov. Zel.* i (1853) 131; *Handb. N.Z. Fl.* (1864) 144. C. Richea *Cass. in Dict. Sci. Nat.* xi (1834) 353; *Benth. Fl. Austral.* iii (1866) 579. Staehelina fimbriata *DC. Prodr. Forst. f. ex DC. Prodr.* vi (1837) 152.

Var. **robusta** *Hook. f. Fl. Nov. Zel.* i (1853) 131.—Stout. Leaves obovate-spathulate, subacute, narrowed into a broad flat petiole, sparsely hispid or glabrate, without white cottony margins. Scape leafy. Compound head large, 1–2 in. diam.—C. uniflora *var.* pedicellata *T. Kirk Students' Fl.* (1899) 317.

Var. **minor** *Hook. f. l.c.*—Small, slender, 6–12 in. high, rarely more. Leaves spathulate, membranous, glabrous or sparsely hispid, sometimes with raised viscid points, usually without white cottony margins. Compound head small, $\frac{1}{4}$–$\frac{1}{2}$ in. diam.—C. viscosa *Col. in Trans. N.Z. Inst.* xvi (1884) 333.

Var. **lanata** *Hook. f. l.c.*—Everywhere clothed with dense shaggy snow-white wool.—C. alpina *Backh. in Hook. Lond. Journ. Bot.* vi (1847) 119; *Hook. f. Handb. N.Z. Fl.* (1864) 144. Trans 43: 376

North and South Islands, Stewart Island: Abundant from the East Cape and Taupo southwards. Sea-level to 5000 ft. December–February.

A most variable plant. The three varieties described above look very distinct in their extreme forms, but are connected with the ordinary state of the species by numerous intermediates.

17. **SIEGESBECKIA** Linn. 1737

Glandular-pubescent herbs with opposite leaves. Heads rather small, in leafy panicles, heterogamous, subradiate. Involucre campanulate or hemispherical; bracts few, in about 2 rows, herbaceous, glandular-hispid; the outer spathulate, spreading; inner erect, concave, enclosing the ray-florets. Receptacle small, paleaceous; scales membranous, concave, often enclosing the florets. Ray-florets in 1 series, female, tube short, limb 2–3-fid. Disc-florets hermaphrodite, tubular with a campanulate 5-toothed mouth. Anthers entire at the base. Style-branches of the hermaphrodite florets short, flattened, usually obtuse. Achenes obovoid-oblong, not compressed, usually curved. Pappus wanting.

Species probably not more than 2, the one found in New Zealand an almost cosmopolitan weed in warm climates, the other confined to Peru.

1. **S. orientalis** *Linn. Sp. Plant.* (1753) 900.—A sparingly branched erect annual 1–3 ft. high, with spreading opposite lower branches, more or less pubescent in all its parts. Leaves 1–4 in. long, triangular-ovate, the upper narrower and oblong-lanceolate, acuminate, cuneate at the base, petiolate, membranous, irregularly toothed or lobed or almost entire. Heads $\frac{1}{4}$–$\frac{1}{3}$ in. diam., yellow; outer involucral bracts usually longer than the inner, covered with gland-bearing hairs. Florets small, the rays very short. Outer achenes rough.—*Benth. Fl. Austral.* iii (1866) 535; *T. Kirk Students' Fl.* (1899) 317; *Cheesem. Man. N.Z. Fl.* (1906) 348.

Kermadec Islands, North Island: In various localities as far south as the East Cape, but not common; usually near the coast. *Punawaru.* January–March.

This was treated as a naturalized plant by Hooker, but as it was collected by Banks and Solander during Cook's first voyage its nativity is unquestionable.

18. **BIDENS** Tourn. 1737

Annual or perennial usually erect herbs. Leaves opposite, toothed or incised or pinnately divided. Heads corymbosely panicled or subsolitary, on long peduncles, heterogamous and radiate, or homogamous and discoid. Involucre campanulate or hemispherical; bracts in about 2 series, connate at the base, the outer herbaceous, the inner membranous. Receptacle flat or convex, paleaceous. Ray-florets when present female or neuter; ligule white or yellow, spreading. Disc-florets hermaphrodite, tubular, 5-toothed. Anthers usually obtuse at the base. Style-branches of the hermaphrodite florets hairy above, with a long or short subulate point.

Achene broad and compressed or slender and tetragonous, often narrowed at the tip. Pappus of 2–4 rigid retrorsely hispid bristles.

A large genus of over 100 species, widely spread in tropical regions, but most plentiful in America. The single New Zealand species is a common weed in all warm countries and many temperate ones.

Exotic

1. **B. pilosa** *Linn. Sp. Plant.* (1753) 832.—An erect glabrous or pubes- variable, or ovate- d mem- , $\frac{1}{3}$–$\frac{1}{2}$ in. rt, often ied with . *Precur.* l. (1864) 99) 318; *Inst.* xxvii (1895) 388.

Bidens pilosa, Linn. ?

not native to N.Z. see T.N.Z.I. vol. 57, p. 62. (Ckn. & Allan).

KERMADEC ISLANDS, NORTH ISLAND: Not uncommon as far south as the East Cape. November–March.

19. **COTULA** Tourn. L. 1735

Creeping or tufted perennial or annual herbs, usually of small size, often aromatic. Leaves alternate, pinnatifid or pinnatisect, rarely entire or toothed. Heads small, peduncled, heterogamous and discoid or rarely homogamous through the suppression of the female florets, sometimes dioecious. Involucre hemispheric or campanulate; bracts in about 2 series, membranous or herbaceous; margins often scarious. Receptacle flat or convex or conical, without scales. Female florets exterior, in 1 or 2 series, fertile; corolla broad or conic or wanting. Disc-florets hermaphrodite or often male; corolla regular, tube slender or stout and 2-winged, limb 4-toothed. Anthers obtuse at the base, entire. Style-branches of the disc-florets truncate or obtuse, sometimes undivided. Achenes compressed, sometimes winged. Pappus wanting.

A genus of 50 or 60 species, scattered widely over the world in both temperate and tropical regions. Several of the New Zealand species are difficult of discrimination, and require further study with more copious suites of specimens.

A. Eucotula. *Receptacle flat or convex. Female florets without any corolla. Achenes of the female florets stipitate, in a single row.*

Stout, glabrous, 2–10 in. high. Leaves lanceolate, $\frac{1}{2}$–2 in., variously toothed or lobed. Heads yellow, $\frac{1}{3}$–$\frac{1}{2}$ in. diam. .. 1. *C. coronopifolia.*

B. Strongylosperma. *Receptacle flat or convex. Female florets without any corolla. Achenes of the female florets in several rows.*

Slender, diffuse, silky. Leaves pinnate or bipinnate. Heads small, $\frac{1}{10}$–$\frac{1}{6}$ in. diam. .. .. 2. *C. australis.*

C. Leptinella. *Receptacle convex or conical. Female florets in 1 or several series; corolla always present, usually inflated at the base.*

* Heads bisexual.

Stout, fleshy. Leaves $\frac{1}{2}$–1 in., much divided. Peduncles leafy. Heads black or dark-brown. Florets tubular or cylindric; rugose .. .. 3. *C. atrata.*

Stout, softly woolly. Leaves 2–6 in., 3–4-pinnatisect. Heads $\frac{1}{3}$–$\frac{1}{2}$ in. diam.; florets eglandular .. .. 4. *C. plumosa.*

Var. **minor** *Hook. f. l.c.*—Small, slender, 6–12 in. high, rarely more. Leaves spathulate, membranous, glabrous or sparsely hispid, sometimes with raised viscid points, usually without white cottony margins. Compound head small, $\frac{1}{4}$–$\frac{1}{2}$ in. diam.—C. viscosa *Col. in Trans. N.Z. Inst.* xvi (1884) 333.

Var. **lanata** *Hook. f. l.c.*—Everywhere clothed with dense shaggy snow-white wool.—C. alpina [illegible] *Lond. Journ. Bot.* vi (1847) 119; *Hook. f. Handb. N.Z. Fl.* (1864) 14

North and
and Taupo south

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Glandular-pubescent herbs [illegible]
in leafy panicles, heterogamous, subradiate. Involucre
hemispherical; bracts few, in about 2 rows, herbaceous, glandular-hispid; the outer spathulate, spreading; inner erect, concave, enclosing the ray-florets. Receptacle small, paleaceous; scales membranous, concave, often enclosing the florets. Ray-florets in 1 series, female, tube short, limb 2–3-fid. Disc-florets hermaphrodite, tubular with a campanulate 5-toothed mouth. Anthers entire at the base. Style-branches of the hermaphrodite florets short, flattened, usually obtuse. Achenes obovoid-oblong, not compressed, usually curved. Pappus wanting.

Species probably not more than 2, the one found in New Zealand an almost cosmopolitan weed in warm climates, the other confined to Peru.

1. **S. orientalis** *Linn. Sp. Plant.* (1753) 900.—A sparingly branched erect annual 1–3 ft. high, with spreading opposite lower branches, more or less pubescent in all its parts. Leaves 1–4 in. long, triangular-ovate, the upper narrower and oblong-lanceolate, acuminate, cuneate at the base, petiolate, membranous, irregularly toothed or lobed or almost entire. Heads $\frac{1}{4}$–$\frac{1}{3}$ in. diam., yellow; outer involucral bracts usually longer than the inner, covered with gland-bearing hairs. Florets small, the rays very short. Outer achenes rough.—*Benth. Fl. Austral.* iii (1866) 535; *T. Kirk Students' Fl.* (1899) 317; *Cheesem. Man. N.Z. Fl.* (1906) 348.

Kermadec Islands, North Island: In various localities as far south as the East Cape, but not common; usually near the coast. *Punawaru.* January–March.

This was treated as a naturalized plant by Hooker, but as it was collected by Banks and Solander during Cook's first voyage its nativity is unquestionable.

18. **BIDENS** Tourn. 1731

Annual or perennial usually erect herbs. Leaves opposite, toothed or incised or pinnately divided. Heads corymbosely panicled or subsolitary, on long peduncles, heterogamous and radiate, or homogamous and discoid. Involucre campanulate or hemispherical; bracts in about 2 series, connate at the base, the outer herbaceous, the inner membranous. Receptacle flat or convex, paleaceous. Ray-florets when present female or neuter; ligule white or yellow, spreading. Disc-florets hermaphrodite, tubular, 5-toothed. Anthers usually obtuse at the base. Style-branches of the hermaphrodite florets hairy above, with a long or short subulate point.

Achene broad and compressed or slender and tetragonous, often narrowed at the tip. Pappus of 2–4 rigid retrorsely hispid bristles.

A large genus of over 100 species, widely spread in tropical regions, but most plentiful in America. The single New Zealand species is a common weed in all warm countries and many temperate ones.

1. **B. pilosa** *Linn. Sp. Plant.* (1753) 832.—An erect glabrous or pubescent herb 1–3 ft. high; branches angular, grooved. Leaves very variable, simple or pinnate; segments 3 or 5, stalked, $\frac{3}{4}$–2 in. long, ovate or ovate-lanceolate, acute or acuminate, serrate or rarely lobed, thin and membranous. Heads few, terminal on long slender peduncles, yellow, $\frac{1}{3}$–$\frac{1}{2}$ in. diam.; involucral bracts about $\frac{1}{4}$ in. long. Ray-florets few and short, often entirely wanting. Achenes black, slender, 4-angled, striate, crowned with 2 or 4 barbed awns.—*A. Rich. Fl. Nouv. Zel.* (1832) 235; *A. Cunn. Precur.* (1838) n. 442; *Raoul Choix* (1846) 45; *Hook. f. Handb. N.Z. Fl.* (1864) 138; *Benth. Fl. Austral.* iii (1866) 543; *T. Kirk Students' Fl.* (1899) 318; *Cheesem. Man. N.Z. Fl.* (1906) 349. B. aurantiacus *Col. in Trans. N.Z. Inst.* xxvii (1895) 388.

KERMADEC ISLANDS, NORTH ISLAND: Not uncommon as far south as the East Cape. November–March.

19. **COTULA** (Tourn.)

Creeping or tufted perennial or annual herbs, usually of small size, often aromatic. Leaves alternate, pinnatifid or pinnatisect, rarely entire or toothed. Heads small, peduncled, heterogamous and discoid or rarely homogamous through the suppression of the female florets, sometimes dioecious. Involucre hemispheric or campanulate; bracts in about 2 series, membranous or herbaceous; margins often scarious. Receptacle flat or convex or conical, without scales. Female florets exterior, in 1 or 2 series, fertile; corolla broad or conic or wanting. Disc-florets hermaphrodite or often male; corolla regular, tube slender or stout and 2-winged, limb 4-toothed. Anthers obtuse at the base, entire. Style-branches of the disc-florets truncate or obtuse, sometimes undivided. Achenes compressed, sometimes winged. Pappus wanting.

A genus of 50 or 60 species, scattered widely over the world in both temperate and tropical regions. Several of the New Zealand species are difficult of discrimination, and require further study with more copious suites of specimens.

A. Eucotula. *Receptacle flat or convex. Female florets without any corolla. Achenes of the female florets stipitate, in a single row.*

Stout, glabrous, 2–10 in. high. Leaves lanceolate, $\frac{1}{2}$–2 in., variously toothed or lobed. Heads yellow, $\frac{1}{3}$–$\frac{1}{2}$ in. diam. .. 1. *C. coronopifolia.*

B. Strongylosperma. *Receptacle flat or convex. Female florets without any corolla. Achenes of the female florets in several rows.*

Slender, diffuse, silky. Leaves pinnate or bipinnate. Heads small, $\frac{1}{10}$–$\frac{1}{6}$ in. diam. .. .. 2. *C. australis.*

C. Leptinella. *Receptacle convex or conical. Female florets in 1 or several series; corolla always present, usually inflated at the base.*

* Heads bisexual.

Stout, fleshy. Leaves $\frac{1}{2}$–1 in., much divided. Peduncles leafy. Heads black or dark-brown. Florets tubular or cylindric; rugose .. .. 3. *C. atrata.*

Stout, softly woolly. Leaves 2–6 in., 3–4-pinnatisect. Heads $\frac{1}{3}$–$\frac{1}{2}$ in. diam.; florets eglandular .. .. 4. *C. plumosa.*

Stout, woolly. Leaves rather fleshy, 1–3 in., pinnate or pinnatifid. Heads $\frac{1}{3}$–$\frac{1}{2}$ in.; florets glandular .. .. 5. *C. lanata.*

Stout, silky. Leaves 2–5 in., pinnatifid. Heads $\frac{1}{3}$ in.; florets eglandular, females in many rows .. .. 6. *C. potentillina.*

Slender, silky or glabrate. Leaves membranous, 1–3 in., pinnatifid. Heads $\frac{1}{3}$ in.; florets glandular, females in 1 row .. 7. *C. Traillii.*

Small, silky, densely matted; stems $\frac{1}{2}$–3 in. Leaves $\frac{1}{6}$–$\frac{1}{2}$ in., pinnatifid. Heads almost sessile, $\frac{1}{10}$–$\frac{1}{8}$ in. diam.; female florets in 1–2 series .. .. 8. *C. Maniototo.*

Stems long, slender, creeping. Leaves membranous, $\frac{1}{2}$–2 in., pinnatifid; segments broad, deeply toothed. Peduncles longer or shorter than the leaves. Heads $\frac{1}{6}$–$\frac{1}{5}$ in. diam.; female florets numerous, in 3–4 series .. .. .. 9. *C. minor.*

Stems slender, wiry. Leaves $\frac{1}{4}$ in., pinnatifid. Heads $\frac{1}{10}$ in. diam. .. .. 10. *C. filiformis.*

Stems rather stout. Leaves pubescent, $\frac{1}{2}$–1$\frac{1}{2}$ in., pinnatifid; segments narrow, incised. Peduncles much longer than the leaves. Heads $\frac{1}{6}$–$\frac{1}{4}$ in.; female florets in 3–4 series .. .. 11. *C. Haastii.*

Stems stout, wiry. Leaves rigid, pectinately pinnatifid; segments entire. Peduncles much longer than the leaves. Heads $\frac{1}{5}$–$\frac{1}{4}$ in.; female florets in 3–4 series .. .. 12. *C. pectinata.*

Stems 1$\frac{1}{2}$–6 in., copiously branched. Leaves pinnatisect, but not pectinately so, sparsely silky or almost glabrate. Heads $\frac{1}{4}$–$\frac{1}{3}$ in.; female flowers in 2–3 series .. .. .. 13. *C. Willcoxii.*

Minute, tufted. Leaves imbricate, $\frac{1}{6}$–$\frac{1}{3}$ in., cut straight down from the tip into 5–7 subulate lobes. Heads small, nearly sessile, $\frac{1}{8}$ in. diam. .. .. 14. *C. Goyeni.*

Stems stout, 6–12 in. long. Leaves $\frac{3}{4}$–2 in., obovate-spathulate, softly pubescent, crenately 3–5-toothed at the tip. Peduncles short. Heads $\frac{1}{2}$ in. diam.; female florets in many series .. 15. *C. Featherstonii.*

Stems stout, 2–3 ft. high. Leaves thin, glabrous. Heads $\frac{1}{2}$ in. diam. .. .. 16. *C. Renwickii.*

** Heads unisexual.

Leaves $\frac{1}{2}$–1$\frac{1}{2}$ in., linear-spathulate, quite entire. Peduncles 2–4 in., bracteate. Heads $\frac{1}{4}$–$\frac{1}{2}$ in. .. .. 17. *C. linearifolia.*

Leaves $\frac{1}{2}$–1$\frac{1}{2}$ in., pinnatifidly cut into 5–8 linear entire segments. Peduncles 1–4 in., bracteate. Heads $\frac{1}{3}$–$\frac{3}{4}$ in. diam. .. .. 18. *C. pyrethrifolia.*

Slender, wiry, silky. Leaves $\frac{1}{4}$–1 in., silky on both surfaces, deeply pinnatifid. Peduncles short, stout, ebracteate. Heads $\frac{1}{8}$–$\frac{1}{4}$ in.; females the largest .. .. 19. *C. perpusilla.*

Slender, creeping, 4–12 in. long. Leaves membranous, 1–2 in., deeply pinnatifid, segments incised. Peduncles 1–3 in., ebracteate. Heads $\frac{1}{6}$–$\frac{1}{5}$ in.; females the largest .. .. .. 20. *C. squalida.*

Minute, creeping. Leaves $\frac{1}{3}$–$\frac{1}{2}$ in., oblong-lanceolate, 3–4-lobed; lobes entire. Heads $\frac{1}{10}$ in. diam. .. .. 21. *C. obscura.*

Slender, creeping, 3–10 in. Leaves linear-obovate, $\frac{1}{2}$–2 in., pinnatifid or pinnate at the base, segments toothed. Heads $\frac{1}{6}$–$\frac{1}{3}$ in. diam. .. .. 22. *C. pulchella.*

Stems stout, creeping, 3–12 in. Leaves $\frac{1}{3}$–2 in., pinnatifid or crenate. Heads $\frac{1}{6}$–$\frac{1}{5}$ in. diam. .. .. 23. *C. dioica.*

Exotic ?

1. **C. coronopifolia** *Linn. Sp. Plant.* (1753) 892.—Perfectly glabrous, smooth and succulent. Stems creeping and rooting below, ascending at the tips, branched, 2–10 in. high. Leaves scattered, dilated and clasping the stem at the base, $\frac{1}{2}$–2 in. long, linear-lanceolate or oblong-lanceolate, coarsely toothed or lobed or pinnatifid or entire. Heads bright-yellow, $\frac{1}{3}$–$\frac{1}{2}$ in. diam., on long slender axillary peduncles exceeding the leaves; involucral bracts linear-oblong, obtuse, membranous. Receptacle slightly convex. Female florets in 1 series, on slender flattened pedicels; corolla wanting; ovary winged, notched at the top; style short, seated in the notch. Disc-florets on much shorter pedicels, very numerous; corolla tubular, more or less dilated at the base, 4-toothed at the tip. Achenes of

COTULA: MAINLAND

1. Heads unisexual 2
   Heads bisexual 8
2. Leaves entire . . . . . linearifolia
   Leaves toothed to pinnate 3
3. Peduncles bracheate, heads ⅓-¾" . . . . . pyrethrifolia
   Peduncles ebracteate, heads not 7½" . . . 4
4. Leaves glabrous or nearly so 6
   Leaves silky to pilose 5
5. Ped. ¼-¾" lvs. ¼-1", sgmts. deeply serrate . . . . . perpusilla
   Ped. 1-5", lvs. 1-2", sgmts. incised on upper margin . . . . . squalida
6. Lvs. obscurely lobed, ⅓-½" . . . . obscura
   Lvs. toothed to pinnatifid, ½-2" 7
7. Achene stipilate . . . . . pulchella
   Achene not stipilate . . . . . dioica
8. Lvs. not 7⅓", hds not 7⅓" 9
   Lvs. 7⅓", heads 7⅓" 11
9. Hds. almost sessile, lvs. silky . maniototo
   Hds. on distinct scapes, but not silky . 10
10. Scape filiform, 1-1½" glabrate. . filiformis
    Scape stouter, shorter, woolly. . . . goyeni
11. Scape leafy, hds. ⅓-¾" . . . . . atrata
    Scape not leafy, hds not 7⅓" 12
12. Female florets few, in one corv. . trailii
    Female florets in several series. . . . 13
13. Leaves pectinately cut . . . . . pectinata
    Leaves not pectinately cut 14
14. Lvs. 1/5 -½", sgmts. lateral pair & terminal one . . . . . willcoxii
    Lvs. ½-2", sgmts. more numerous 15
15. Lvs. glabrate, stems slender, sgmts. broad . . . . . minor
    Lvs. pubescent, stems stouter, sgns. narrow . . . . . haastii

Inst. xlvii (1915) 118.

C - atrata x Dendyi

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the female florets oblong, compressed, with a broad spongy wing; those of the disc-florets smaller, with a much narrower wing.—*Forst. f. Prodr.* (1786) 57; *A. Rich. Fl. Nouv. Zel.* (1832) 235; *A. Cunn. Precur.* (1838) n. 443; *Raoul Choix* (1846) 45; *Hook. f. Fl. Nov. Zel.* i (1853) 127; *Handb. N.Z. Fl.* (1864) 141; *Benth. Fl. Austral.* iii (1866) 549; *T. Kirk Students' Fl.* (1899) 322; *Cheesem. Man. N.Z. Fl.* (1906) 351.

Var. **integrifolia** *T. Kirk l.c.*—Stems small, 1–2 in., almost simple. Leaves linear, entire, obtuse. Peduncle terminal, slender. Head small, $\frac{1}{8}$–$\frac{1}{4}$ in. diam.—C. integrifolia *Hook. f. Fl. Tasm.* i (1860) 192, t. 50B.

North and South Islands, Stewart Island, Chatham Islands: Not uncommon in wet places in lowland districts. October–February.

Widely spread through the South Temperate Zone; also found in some parts of Europe and North America, but probably naturalized only. For some remarks on var. *integrifolia* see a paper by myself in Trans. N.Z. Inst. lii (1920) p. 10.

2. **C. australis**, *Hook. f. Fl. Nov. Zel.* i (1853) 128.—A slender much-branched flaccid herb 2–6 in. high; branches spreading, prostrate or sub-erect, more or less clothed with long lax hairs or almost glabrous. Leaves $\frac{1}{2}$–1 in. long, oblong in outline, membranous, deeply pinnatifid or bipinnatifid; ultimate segments linear, entire, acute or mucronate. Heads

Cotula australis, Hook.f.

perhaps not native to N.Z. see T.N.Z.I. vol. 57, p. 63. (Ckn. & Allan).

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3. **C. atrata** *Hook. f. Handb. N.Z. Fl.* (1864) 142.—Rhizome stout, creeping, tortuous; roots long and stringy. Stems 1–6 in. high, erect or ascending, stout, leafy, densely pubescent. Leaves $\frac{1}{2}$–$1\frac{1}{2}$ in. long, thick and fleshy, pubescent on both surfaces; petiole broad, flat, sheathing at the base; blade linear-oblong or linear-obovate in outline, pinnatifid; segments close-set, entire or toothed or again pinnatifid; cauline leaves smaller, pinnatifid or lobed. Heads subglobose, $\frac{1}{3}$–$\frac{3}{4}$ in. diam., black or brownish-yellow; involucral bracts in 2–4 series, linear-obovate, entire or pinnatifid, shorter than the florets or equalling them. Female florets in 3–5 series; corolla cylindric, rugose, 3–4-toothed. Disc-florets with a long rugose tube and narrow funnel-shaped 4-toothed limb. Achenes linear-oblong or linear-obovoid, rugose.—*T. Kirk Students' Fl.* (1899) 323; *Cheesem. Man. N.Z. Fl.* (1906) 352; *Ill. N.Z. Fl.* i (1914) t. 106.

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South Island: Dry shingle-slopes in alpine localities, Nelson to Otago; not uncommon. 3500–6500 ft. January–February.

Not closely allied to any other species. Its stout pubescent habit and greyish-green colour, much divided leaves, robust leafy peduncles, and large black or brownish-yellow heads are prominent characters, and will enable it to be recognized with the utmost ease.

4. **C. plumosa** *Hook. f. Handb. N.Z. Fl.* (1864) 141.—A large densely tufted aromatic species, often forming broad soft patches, everywhere clothed with long villous hairs. Stems short, stout, creeping. Leaves on long slender petioles 3–6 in. long; blade 2–6 in., oblong in outline, flaccid and membranous, finely 3–4-pinnatifid; primary divisions close-set, linear-oblong, recurved, 2-pinnatifid on the upper side; ultimate segments $\frac{1}{6}$ in. long, linear, toothed on one side. Peduncles slender, shorter than the leaves, usually with a linear entire or pinnatifid bract about the middle. Head $\frac{1}{3}$–$\frac{1}{2}$ in. diam.; involucral bracts in 2 or 3 series, broadly oblong, with broad purplish-black margins. Receptacle conical. Female florets in 2–3 series, shortly pedicelled; corolla compressed, swollen at the base, contracted towards the mouth, unequally 4-toothed. Disc-florets funnel-shaped, 5-toothed. Achenes of the female florets obovoid; those of the disc-florets minute, abortive.—*T. Kirk Students' Fl.* (1899) 323; *Cheesem. Man. N.Z. Fl.* (1906) 352; *Subantarct. Is. N.Z.* ii (1909) 416; *Rept. Austr. Ant. Exp.* Ser. C, vol. vii, pt. 3 (1919) 30. Leptinella plumosa *Hook. f. Fl. Antarct.* i (1844) 26, t. 20.

Auckland and Campbell Islands, Antipodes Island: Maritime rocks and meadows near the sea, *Hooker, T. Kirk!* and all subsequent botanists, abundant. Macquarie Island: Plentiful close to the sea, *Scott, A. Hamilton, H. Hamilton!* December–January.

A very handsome species, by far the finest of the genus, easily recognized by the large pale-green feathery foliage. It is also found in Kerguelen Island and the Crozets. In Kerguelen Island it is the only Composite, and forms immense blue-green patches where the soil is enriched by the dung of birds.

5. **C. lanata** *Hook. f. Handb. N.Z. Fl.* (1864) 141.—Stems stout, prostrate and rooting below, ascending at the tips, branched, 3–12 in. long, densely clothed with white woolly hairs or glabrate. Leaves 1–3 in. long, woolly or glabrate, rather thick, with broad sheathing petioles; blade oblong in outline, pinnate or pinnatifid; pinnae close-set, curved, 3–5-toothed or -lobed along the upper edge, minutely glandular. Peduncles terminal, shorter than the leaves, stout, woolly. Heads $\frac{1}{4}$–$\frac{1}{3}$ in. diam.; involucral bracts in several series, broadly oblong, obtuse, green. Florets all studded with pellucid conglobate glands; females ovate-oblong, broadest at the base, narrow at the mouth and minutely 4-toothed; disc-florets narrow funnel-shaped, 5-toothed. Achenes of the female florets obovate, compressed; those of the disc-florets minute, abortive.—*T. Kirk Students' Fl.* (1899) 323; *Cheesem. Man. N.Z. Fl.* (1906) 353; *Subantarct. Is. N.Z.* ii (1909) 417. Leptinella lanata *Hook. f. Fl. Antarct.* i (1844) 25, t. 19. L. propinqua *Hook. f. l.c.* 27.

see Subant. Is. 1909

Auckland and Campbell Islands: Abundant on rocks near the sea, *Hooker, T. Kirk! Chapman!* and all subsequent collectors. December–February.

Varies much in the size and breadth of the leaves, and the extent to which they are divided, also in the degree to which the loose white cottony hairs of the young stems and leaves are developed. I have seen no specimens of *C. propinqua*, said to be intermediate between *C. plumosa* and *C. lanata*.

(F.v.M.) Bruce 1916 p. 617.

6. **C. potentillina** *Cockayne Veg. N.Z.* (1921) 344.—Stems long, rather stout, creeping and rooting, branched, sparingly villous towards the tips; branches ascending. Leaves 2–5 in. long; petiole ¾–2 in., sheathing at the base; blade 1–3 in., linear-obovate, membranous, glabrate or slightly silky, gland-dotted, deeply pinnatifid; segments oblong, closely toothed or lobed, teeth acute. Peduncles 1–3 in. long, usually shorter than the leaves, pubescent. Heads ⅓ in. diam.; involucral bracts in about 3 series, oblong-ovate, obtuse or subacute, membranous. Female florets in many rows, usually more numerous than the disc-florets; corolla short, ovoid, not glandular. Disc-florets larger; corolla tubular, 4-toothed; style undivided. Achenes of the female florets clavate, tetragonous.—C. Muelleri *T. Kirk Students' Fl.* (1899) 324; *Cheesem. Man. N.Z. Fl.* (1906) 353. Leptinella potentillina *F. Muell. Veg. Chath. Is.* (1864) 28, t. 6.

CHATHAM ISLANDS: Not uncommon in moist places, *H. H. Travers! J. D. Enys! Cockayne* and *F. A. D. Cox!*

This was apparently referred to *C. lanata* by Sir J. D. Hooker (Handbook, p. 733), but it differs from that plant in being much less woolly, in the larger leaves with broader toothed segments, longer peduncles, and glandless florets. As Mueller's name of *potentillina* is certainly the oldest and consequently entitled to priority I am following Cockayne in using it here.

7. **C. Traillii** *T. Kirk Students' Fl.* (1899) 324.—Stems slender, creeping and rooting, 3–12 in. long, silky towards the tips. Leaves 1–3 in.; petiole slender, sheathing at the base; blade linear-obovate, membranous, glabrate or with scattered lax hairs on both surfaces, deeply pinnatifid; segments close-set, broadly oblong, toothed on the upper margin and round the apex, teeth apiculate or hair-tipped. Peduncles axillary, pubescent, usually shorter than the leaves. Heads ⅓ in. diam., involucral bracts in 2–3 series, orbicular-ovate, membranous, with scarious purplish margins. Female florets few, in 1 series, shortly stipitate; corolla ovoid, compressed. Disc-florets very numerous, funnel-shaped, 4-lobed; style undivided, with a discoid stigma. Achenes of the female florets broadly ovoid or almost orbicular, turgid, 3-winged.—*Cheesem. Man. N.Z. Fl.* (1906) 354.

SOUTH ISLAND: Bluff Hill, *Cockayne;* Dog and Centre Islands, *Cockayne.* STEWART ISLAND: Not uncommon on sand-dunes and in salt marshes, *T. Kirk! Cockayne.* December–February.

Very closely allied to *C. potentillina,* of which it may be a variety. The habit is the same, and the leaves can only be distinguished by the smaller size and apiculate segments. But the heads are markedly different in the few female florets, which are in one row only, and have much broader achenes.

8. **C. Maniototo** *Petrie in Trans. N.Z. Inst.* xiv (1882) 362.—Small, densely matted, forming broad greyish patches; everywhere covered with long silky hairs. Stems ½–3 in. long, creeping and rooting; branches very short, leafy. Leaves numerous, silky on both surfaces, dilated and sheathing at the base, ⅙–⅓ in. long, linear-oblong, deeply pinnatifid; segments narrow-linear, acute. Heads terminating the branches, almost sessile, minute, $\frac{1}{10}$–⅛ in. diam.; involucral bracts in 2 series, broadly oblong or obovate, obtuse, silky on the outside, membranous. Female florets in 1 or 2 series; corolla narrow-tubular, almost filiform, with a 2-lipped mouth; style exserted, 2-fid. Disc-florets much larger; corolla funnel-shaped with a long tube, 4–5-toothed; anthers and style exserted. Achenes of the female florets oblong, smooth and turgid, hardly winged; those of the disc-florets minute, abortive.—*T. Kirk Students' Fl.* (1899) 323; *Cheesem. Man. N.Z. Fl.* (1906) 354.

C. potentillina (F.v.Muell) Bruce 1916 : 617

South Island: Canterbury—Lake Lyndon, *J. D. Enys! T. Kirk! T. F. C.*; near the mouth of the Waimakariri River, *Cockayne!* Lake Tekapo, *T. F. C.*; Tasman Valley, *T. F. C.* Otago—Kakanui, Maniototo Plain. Nevis Valley, Mossburn, Lake Te Anau, *Petrie! Buchanan!* Hokanui, *J. Crosby Smith.* Sea-level to 3000 ft. January–February.

A very distinct little species, probably common throughout the South Island.

9. **C. minor** *Hook. f. Handb. N.Z. Fl.* (1864) 142.—Stems slender, creeping, branched, 2–12 in. long or more, glabrous or silky at the tips. Leaves alternate on slender creeping runners or fascicled on short lateral branchlets, thin and membranous, glabrous or slightly silky, $\frac{1}{2}$–2 in. long, linear-oblong or linear-obovate in outline, pinnatifid almost to the base; segments close-set or the lower distant, oblong or obovoid, recurved, deeply and acutely toothed on both edges or on the upper only. Peduncles slender, naked, shorter or longer than the leaves. Heads small, $\frac{1}{6}$–$\frac{1}{5}$ in. diam.; involucral bracts few, 8–12, broadly oblong or orbicular, usually with broad purplish margins. Female florets in 3–4 series; corolla inflated, broadly ovoid, with a narrow 2–3-toothed mouth. Disc-florets fewer in number, funnel-shaped, 4-toothed. Achenes of the female florets obovoid, glandular. —*T. Kirk Students' Fl.* (1899) 324; *Cheesem. Man. N.Z. Fl.* (1906) 354. Leptinella minor *Hook. f. Fl. Nov. Zel.* i (1853) 129. Soliva tenella *A. Cunn. Precur.* (1838) n. 445.

North and South Islands: Not uncommon from the North Cape southwards. Sea-level to 2500 ft. November–January.

10. **C. filiformis** *Hook. f. Handb. N.Z. Fl.* (1864) 142.—A slender rigid creeping plant forming broad patches; branches numerous, rooting. Leaves minute, $\frac{1}{4}$ in. long, oblong, pinnatifid; segments subulate, entire or sparingly toothed on the upper margin, glabrous. Scapes filiform, 1–1$\frac{1}{2}$ in. long, glabrous or faintly pilose. Heads minute, $\frac{1}{10}$ in. diam.; involucral scales 6–8, orbicular with purple edges; receptacle conical; ray-florets about 20; corolla short, compressed, inflated, very broad-oblong, 2-lobed above; achene obconic, glandular; disc-florets funnel-shaped, 4-lobed; lobes glandular. — *T. Kirk Students' Fl.* (1899) 325; *Cheesem. Man. N.Z. Fl.* (1906) 365.

South Island: Canterbury Plains, among grass, *Haast;* Hanmer Plains, dry ground among *Leptospermum, C. E. Christensen.*

I have not seen specimens of this species, and the above description (which may require amendment) is partly based on Hooker's original diagnosis, and on some notes by Dr. Cockayne on examples collected by Mr. Christensen at Hanmer.

11. **C. Haastii** *T. Kirk Students' Fl.* (1899) 325. — Stems rather short, stout, creeping, branched, 1–6 in. long or more, pubescent. Leaves $\frac{1}{2}$–1$\frac{1}{2}$ in. long, pubescent on both surfaces, gland-dotted, linear-oblong or linear-obovate, deeply pinnatifid or almost pinnate; segments narrow-oblong, recurved, entire or deeply toothed or incised, teeth often confined to the upper margin. Peduncles slender, pubescent, much longer than the leaves. Heads $\frac{1}{6}$–$\frac{1}{4}$ in. diam.; involucral bracts in 2–3 series, broadly oblong, obtuse, with broad purple tips. Receptacle convex. Female florets in 3–4 series; corolla short, ovoid, compressed. Disc-florets very numerous, funnel-shaped, with 4 short and broad teeth. Achene oblong-obovoid, obscurely angled, glandular.—*Cheesem. Man. N.Z. Fl.* (1906) 355.

South Island: Canterbury—Banks Peninsula, common on dry banks, particularly near the sea, or on the seaward side of the hills, *Haast! T. Kirk! Cockayne! R. M. Laing!* Canterbury Plains, *Haast* (*vide* Handbook). Sea-level to 2500 ft. December–January.

Closely allied to *C. pectinata*, but the leaves are broader, with the segments deeply toothed or incised.

12. **C. pectinata** *Hook. f. Handb. N.Z. Fl.* (1864) 142.—Stems 1–6 in. long, creeping and rooting, rather stout, wiry, woolly or glabrate, often putting out silky runners. Leaves few, scattered, rigid, glabrous or silky, $\frac{3}{4}$–$1\frac{1}{2}$ in. long, linear-oblong in outline, pectinately pinnatifid; segments short, subulate, entire. Peduncles slender, naked or rarely with a minute bract about the middle, 1–3 in. long, exceeding the leaves. Heads $\frac{1}{5}$–$\frac{1}{4}$ in. diam., involucral bracts in 2–3 series, broadly oblong, pubescent, purplish; margins jagged. Female florets in several series; corolla ovoid, compressed, minutely 2–4-toothed at the narrow mouth. Disc-florets funnel-shaped, 4-toothed. Achene narrow-obovoid, compressed and slightly winged.—*T. Kirk Students' Fl.* (1899) 325; *Cheesem. Man. N.Z. Fl.* (1906) 356.

Ch. Allan 57:52

(Var.) **sericea** (*T. Kirk*) *l.c.* 326.—Smaller and more compactly branched, everywhere clothed with long dense silky hairs. Peduncles shorter and stouter, $\frac{1}{2}$–1 in. long. Heads $\frac{1}{3}$ in. diam. Perhaps a distinct species.

South Island: Nelson—Clarence Valley, *T. F. C.*; Mount Captain, *T. Kirk!* Canterbury—Mountains above the Broken River, *J. D. Enys! T. Kirk! T. F. C.*; Mount Torlesse, *Haast!* Mount Cook district, *T. F. C.* Otago—Mount Ida, Mount Cardrona, and plentiful in most mountain districts, *Petrie! Cockayne! Poppelwell.* Var. *sericea:* Old Man Range and Mount Cardrona, *Petrie!* Ben Lomond, Mount Ida, Mount Pisa, *Cockayne!* Altitudinal range from 1500 to 6000 ft. December–February.

13. **C. Wilcoxii** *Cheesem. in Trans. N.Z. Inst.* xlviii (1916) 212.—Stems $1\frac{1}{2}$–6 in. long, creeping and rooting, copiously branched and usually forming compact patches, sparsely silky-pilose or sometimes nearly glabrous. Leaves alternate, petiolate, with the petiole $\frac{1}{5}$–$\frac{1}{2}$ in. long, glabrous or faintly pubescent, gland-dotted, pinnatisect; segments usually a single pair with a terminal one, rarely two pairs, flat, linear-oblong, subacute, usually quite entire or very rarely one or both of the lower segments are forked at the tip. Peduncles long, slender, naked, sparingly pilose, $\frac{3}{4}$–2 in. long, much exceeding the leaves. Heads $\frac{1}{4}$–$\frac{1}{3}$ in. diam.; involucral bracts in 1–2 series, oblong, obtuse, purplish at the tips, margins scarious, jagged. Female florets in 2–3 series; florets of the disc narrow funnel-shaped, 4-toothed. Achene narrow-obovoid.

South Island: Otago—Head of Lake Wakatipu, near Mount Earnslaw, *W. Wilcox!* December–February. T. 71: 97.

A well-marked species, closely allied to *C. pectinata* in the structure of the flower-heads, but in other respects showing many points of difference. It is larger, and much more glabrate; the peduncles are longer and more slender; and the leaves are never pectinate-pinnatifid, which is always the case in *C. pectinata*. Usually the leaves have only a single pair of segments with a terminal one, but more rarely there are two pairs of segments, in that case resembling small forms of *C. pyrethrifolia*. From that plant, however, it is at once distinguished by the bisexual flower-heads, to say nothing of other differences. I have seen no specimens except those gathered by Mr. Wilcox, which are copious and in good condition.

14. **C. Goyeni** *Petrie in Trans. N.Z. Inst.* xviii (1886) 295.—A small tufted species. Stems 1–3 in. long, creeping and rooting, much branched; branches short, ascending at the tips, with the leaves $\frac{1}{4}$ in. diam. Leaves alternate, imbricate, appressed to the branch, $\frac{1}{8}$–$\frac{1}{5}$ in. long; lower $\frac{1}{2}$ broad, membranous, glabrous or more or less pubescent, sheathing at the base; upper $\frac{1}{2}$ cut straight down into 5–7 linear-subulate erect lobes. Heads terminal, minute, $\frac{1}{8}$ in. diam., on short woolly peduncles rarely exceeding the leaves; involucral bracts in 1 or 2 series, ovate-oblong, with scarious purple margins. Female florets few, in 1 series; corolla ovoid, compressed, narrowed at the mouth. Disc-florets numerous, funnel-shaped. Mature achenes not seen.—*T. Kirk Students' Fl.* (1899) 326; *Cheesem. Man. N.Z. Fl.* (1906) 356.

Var. **pinnatisecta** *T. Kirk l.c.*—Leaves pinnatifid, clothed with silky hairs.

South Island: Otago—Mount Pisa and the Hector Mountains, *Petrie!* Garvie Mountains, *Poppelwell.* Var. *pinnatisecta:* The Remarkables, near Lake Wakatipu, *Petrie!* 5000–6000 ft. January–February. T.M.; 97.

A curious little plant, perhaps nearest to *C. pectinata.* The leaves closely resemble those of *Azorella Selago.*

15. **C. Featherstonii** *F. Muell. ex Hook. f. Handb. N.Z. Fl.* (1867) 733.—Stems 6–12 in. high or more, rather stout, prostrate or decumbent at the base, ascending above, much branched, leafy, clothed with short soft pubescence. Leaves alternate, $\frac{3}{4}$–2 in. long, obovate-spathulate or oblong-spathulate, gradually narrowed to a sessile base, crenately 3- or 5-toothed at the tip or entire, flat, fleshy, finely and softly pubescent on both surfaces. Peduncles axillary and terminal, $\frac{1}{2}$–1 in. long. Heads $\frac{1}{3}$ in. diam., yellow; involucral bracts 10–15, in about 2 series; outer ovate-lanceolate, inner broadly oblong. Female florets in many series; corolla ovoid or conical, swollen at the base, obscurely toothed at the contracted mouth. Disc-florets numerous, tubular, 4-toothed. Achenes narrow-obovoid, prominently costate, glandular.—*T. Kirk Students' Fl.* (1899) 327; *Cheesem. Man. N.Z. Fl.* (1906) 356. Leptinella Featherstonii *F. Muell. Veg. Chath. Is.* (1864) 27, t. 5.

Chatham Islands: Usually near the shore in rocky places overlaid with peat, *H. H. Travers! F. A. D. Cox* and *Cockayne!*

A very remarkable plant, whose only near ally is the following species.

16. **C. Renwickii** *Cockayne in Trans. N.Z. Inst.* xlvii (1915) 119.—An erect perennial herb 2–3 ft. high. Stems strict, somewhat woody, ringed with the scars of the fallen leaves. Leaves apparently crowded at the tips of the branches, $1\frac{1}{2}$–2 in. long, $\frac{1}{3}$–$\frac{2}{3}$ in. broad, obovate-spathulate, gradually narrowed into a slightly expanded sessile base, 5–7-nerved, glabrous, membranous, furnished with 3–5 crenatures at the rounded apex. Peduncles $\frac{1}{2}$ in. long, sparingly pilose with whitish hairs. Heads $\frac{1}{2}$ in. diam., yellow; involucral bracts about 12, in 2 series, oblong, glabrous, scariose at the apex. Female florets in many series, corolla ovoid, swollen at the base. Disc-florets numerous, tubular, 4-toothed.

Chatham Islands: Cliffs of the small islets known as the Forty-fours, *Renwick!*

I am indebted to Dr. Cockayne for the loan of the type specimen of this species. I find little to separate it from *C. Featherstonii* save the greater size and thin glabrous leaves, and should not be at all surprised if it proves to be a large form of that plant.

17. **C. linearifolia** *Cheesem. in Trans. N.Z. Inst.* xv (1883) 299.—Small, dark-green, rather thick and fleshy, aromatic, sparingly pilose. Stems prostrate, branched, ascending at the tips. Leaves alternate, ½–1½ in. long, narrow-linear or linear-spathulate, obtuse, gradually narrowed to the sheathing base, quite entire, coriaceous, gland-dotted. Peduncles 2–4 in. long, slender, terminal, with 4–8 small linear bracts. Heads unisexual, ¼–⅓ in. diam.; involucral bracts in about 3 series, linear-oblong, obtuse, with purplish scarious margins. Receptacle convex. Florets studded with transparent glands; female corolla swollen at the base, obscurely tetragonous, narrowed above, minutely 4-toothed; corolla of the males smaller and more slender, narrow funnel-shaped, 4-lobed. Achene linear-obovoid, compressed. —*T. Kirk Students' Fl.* (1899) 326; *Cheesem. Man. N.Z. Fl.* (1906) 357.

South Island: Nelson—Raglan Mountains, eastern side of the Wairau River, near Tophouse, *T. F. C.* 3000–4500 ft. December–January.

Distinguished from *C. pyrethrifolia* by the entire leaves. In outward appearance it closely resembles *Abrotanella linearis.* Abundant in the locality in which it was originally discovered, but so far has not been found elsewhere.

18. **C. pyrethrifolia** *Hook. f. Handb. N.Z. Fl.* (1864) 142.—Stout, rather fleshy, aromatic, glabrous or sparingly pilose. Rhizome creeping, often branched; stems prostrate or decumbent at the base, ascending at the tips. Leaves alternate, fleshy or coriaceous, ½–1½ in. long; petiole usually ½ the length, sheathing at the base; blade pinnatifidly cut into 5–8 alternate narrow-linear to linear-oblong obtuse segments $\frac{1}{10}$–¼ in. long. Peduncles variable in length, ½–4 in., with 1 or several linear bracts. Heads unisexual, large, ⅓–¾ in. diam.; involucral bracts in 2–3 series, linear-oblong, obtuse, herbaceous, with purplish scarious margins. Receptacle convex. Florets glandular; corolla of the females inflated and truncate at the base, 4-toothed at the mouth; of the males funnel-shaped, 4-lobed. Achene narrow-obovoid.—*T. Kirk Students' Fl.* (1899) 327; *Cheesem. Man. N.Z. Fl.* (1906) 357; *Ill. N.Z. Fl.* i (1914) t. 108.

North Island: Wellington—Tararua Mountains, on Mount Hector, *Petrie! B. C. Aston!* South Island: Plentiful in mountain districts from the north of Nelson and Marlborough southwards through Canterbury and Westland; apparently less common in Otago. 2500–6000 ft. December–February.

Easily distinguished by the coarse almost glabrous habit, the decumbent or prostrate stems, the deeply pinnatifid leaves with their few linear lobes, and the large strictly unisexual heads. Like many other species of the genus, it is highly aromatic, especially when bruised.

19. **C. perpusilla** *Hook. f. Handb. N.Z. Fl.* (1864) 143.—Often forming broad patches, more or less silky in all its parts. Rhizome much branched, creeping, rigid and wiry, 2–9 in. long or more; branchlets short, erect, leafy. Leaves tufted, silky on both surfaces, ¼–1 in. long, linear-oblong or linear-obovate, deeply pinnatifid; segments close-set, sometimes slightly recurved, deeply serrate on the upper edge or entire. Peduncles short, stout, rigid, silky, ¼–¾ in. long. Heads unisexual; males ⅛–⅙ in. diam.; involucral bracts in 1 or 2 series, broadly oblong, silky, with broad purple scarious margins. Florets numerous, eglandular, funnel-shaped. Female heads larger, ⅕–¼ in. diam.; involucral bracts in 3–4 series, larger and broader than in the males, incurved over the florets and often concealing them. Florets numerous; corolla ovoid, inflated at the base, contracted at the minutely toothed mouth. Achenes somewhat

curved, rounded on the back or obscurely trigonous.—*T. Kirk Students' Fl.* (1899) 327; *Cheesem. Man. N.Z. Fl.* (1906) 358. Leptinella pusilla *Hook. f. Fl. Nov. Zel.* i (1853) 129.

North Island: East Cape and Hawke's Bay, *Colenso!* South Island: Not uncommon from Nelson and Marlborough southwards to Foveaux Strait. Sea-level to 4500 ft. November–February.

20. **C. squalida** *Hook. f. Handb. N.Z. Fl.* (1864) 143.—Stems long, slender, creeping, branched, 4–12 in. long or more, silky or pilose; branchlets short, erect. Leaves 1–2 in. long, linear-obovate in outline, petiolate, flaccid and membranous, more or less pilose with long soft hairs, deeply pinnatifid; segments rather lax, recurved, deeply incised along the upper margin or more rarely along both margins. Peduncles 1–3 in. long, slender, naked, silky. Heads unisexual; males $\frac{1}{6}$–$\frac{1}{5}$ in. diam.; involucral bracts few, in 2 series, broadly oblong-obovate, silky, with broad purplish scarious margins. Florets numerous, eglandular, funnel-shaped. Female heads larger, $\frac{1}{4}$–$\frac{1}{3}$ in. diam.; involucral bracts in 3–4 series, broad, rounded, silky, purplish, usually incurved over the florets and concealing them. Florets numerous; corolla ovoid, inflated at the base, much contracted at the mouth, minutely 4-toothed. Achene curved, rounded at the back, almost trigonous.—*T. Kirk Students' Fl.* (1899) 328; *Cheesem. Man. N.Z. Fl.* (1906) 358. Leptinella squalida *Hook. f. Fl. Nov. Zel.* i (1853) 129.

North Island: Auckland—Bay of Plenty, *Petrie!* Mount Hikurangi, *Adams* and *Petrie!* Taranaki—Upper portion of the Patea River and Mount Egmont Ranges, *T. F. C.* Hawke's Bay—Base of the Ruahine Mountains, *Colenso!* South Island: Not uncommon from Nelson and Marlborough to Foveaux Strait. Sea-level to 4000 ft. December–February.

Closely allied to *C. perpusilla*, but distinguished by the greater size, soft flaccid leaves with deeply incised segments, and by the larger pistillate heads, which have the involucral bracts so much incurved as to completely hide the florets.

21. **C. obscura** *T. Kirk Students' Fl.* (1899) 327.—"Stems short, slightly creeping, $\frac{3}{4}$–1 in. long, rather stout for the size of the plant. Leaves few, tufted, glabrous, fleshy, $\frac{1}{3}$–$\frac{1}{2}$ in. long including the petiole, oblong-lanceolate, obtuse, shortly pinnatifid or with 3 obtuse lobes on each side. Scapes longer or shorter than the leaves, glabrous. Heads unisexual, about $\frac{1}{10}$–$\frac{1}{8}$ in. diam.; involucral bracts 5–6, oblong or oblong-ovate, fleshy, glabrous or glabrate. Receptacle conical. Female florets few; corolla tubular, as long as the ovary; mouth minutely 3–4-toothed, eglandular; achenes (immature) linear-oblong, cuneate. Male florets trumpet-shaped; mouth broad, 4-lobed."—C. dioica *var.* obscura *Cheesem. Man. N.Z. Fl.* (1906) 359.

South Island: Swamps at Woodend, Southland, *T. Kirk!*

In the Manual I treated this as a variety of *C. dioica*, but the short and stout stems, oblong-lanceolate leaves with 3–4 lobes on each side, and short stout scapes do not match any specimens of *C. dioica* that I have seen. I have seen no examples except those gathered by Mr. Kirk, and I consequently reproduce his description herewith.

22. **C. pulchella** *T. Kirk Students' Fl.* (1899) 328.—Stems slender, creeping, branched, 3–10 in. long or more. Leaves $\frac{1}{2}$–2 in. long, glabrate or more or less hairy, linear-obovate, membranous, obtuse at the tip, gradually tapering into the petiole, pinnatifid or pinnate at the base; segments in 6–9 pairs, deeply 2–4-toothed at the tips; petiole long, slender.

Heads unisexual; peduncles axillary, shorter or longer than the leaves. Females $\frac{1}{6}$–$\frac{1}{2}$ in. diam., involucre hemispherical, bracts in 2–3 series, outer orbicular-ovate with erose purple or green margins, inner narrow-oblong. Corolla eglandular, ovoid-conical, about $\frac{1}{3}$ as long as the ovary. Achene stipitate, slightly curved, plano-convex. Male heads smaller; corolla funnel-shaped, 5-lobed.—C. dioica *var.* pulchella *Cheesem. Man. N.Z. Fl.* (1906) 328. 359

South Island: Canterbury—Swamps near Lincoln, *T. Kirk!* Otago—Swamps near Dunedin, *Petrie! T. Kirk!* Southland—Abundant in coastal moors, *Cockayne.* Stewart Island: Paterson's Inlet, *T. Kirk!* abundant, *Cockayne.* December–February. see Chen. Reb. Bot. Surv. Stew. Id. 64.

Although I united this with *C. dioica* in the first edition of this work I now think that it is preferable to treat it as a distinct species. Mr. Kirk gives its differential characters ("Students' Flora" (1899), p. 328) as follows: "The leaves are much longer and more deeply divided, never flaccid; the female corolla is longer and narrower, and the stipitate achene is turgid and convex at the back." It is much to be wished that some botanist resident in the southern portion of the Dominion would investigate, with the aid of fresh specimens, the differences between the three species *C. obscura*, *C. pulchella*, and *C. dioica*.

23. **C. dioica** *Hook. f. Handb. N.Z. Fl.* (1864) 143.—Stems creeping, rather stout or slender, glabrous or slightly hairy, 3–12 in. long. Leaves tufted or solitary, membranous, often flaccid, petiolate, $\frac{1}{2}$–2 in. long, linear-obovate or spathulate, obtuse, crenate-serrate or lobulate or semipinnatifid, often deeply pinnatifid or pinnate at the base, lobes or segments entire or the upper margins more or less deeply toothed or incised. Peduncles axillary, longer or shorter than the leaves, naked, more or less pubescent. Heads unisexual; males $\frac{1}{6}$–$\frac{1}{4}$ in. diam.; involucral bracts few, in 2 series, oblong-orbicular, pubescent, with broad purple scarious margins. Florets numerous, eglandular, funnel-shaped. Female heads larger, $\frac{1}{5}$–$\frac{1}{3}$ in. diam. or more; involucral bracts more numerous, imbricated in 3 or 4 series, incurved. Florets many; corolla ovoid-conic, inflated at the base, narrowed and minutely toothed at the mouth. Achene obovoid, curved, rounded at the back.—*T. Kirk Students' Fl.* (1899) 328; *Cheesem. Man. N.Z. Fl.* (1906) 358. Leptinella dioica *Hook. f. Fl. Nov. Zel.* 1 (1853) 129.

Var. **crenatifolia** *T. Kirk Students' Fl.* (1899) 328.—Leaves $\frac{3}{4}$–3 in., oblong-spathulate, membranous, crenate-toothed, with a few deeper divisions at the base of the leaf. —*Cheesem. l.c.* 359. T. 71:97.

Var. **rotundata** *Cheesem. l.c.*—More robust and hairy. Leaves $\frac{1}{2}$–$1\frac{1}{2}$ in. long, orbicular-spathulate, toothed above, usually lobulate or pinnatifid below.

North and South Islands, Stewart Island: Not uncommon from the Great Barrier Island and the Kaipara Harbour, most plentiful near the coast. Var. *crenatifolia:* Usually in inland swamps, ascending to 3500 ft. Var. *rotundata:* Cliffs between the Manukau and Kaipara Harbours, *T. F. C.;* east coast, *Colenso!*

Exceedingly variable in the size of the leaves and the extent to which they are toothed or divided, and also varying much in the size of the flower-heads.

20. **CENTIPEDA** Lour. 1790

Annual or perennial herbs. Leaves alternate, entire or coarsely toothed. Heads small, sessile on the branches or racemose, heterogamous and discoid. Involucre hemispherical; bracts in 2 series, subequal, margins scarious. Receptacle flat or convex, naked. Female florets exterior, in several rows,

fertile; corolla minute, tubular, obscurely lobed. Disc-florets few, hermaphrodite, campanulate, 4-lobed. Anthers obtuse at the base. Style-branches of the disc-florets short, truncate. Achenes scarcely compressed, obtusely 3–4-ribbed or -angled. Pappus wanting.

A small genus of 5 species, 4 of which are Asiatic or Australasian, the fifth South American. It is closely allied to *Cotula*, but differs in the inflorescence and in the tubular corollas of the female florets. The New Zealand species extends to Australia, the Pacific islands, and eastern tropical Asia.

C minima (L). A. B. ex Anderson 1867.

1. **C. orbicularis** *Lour. Fl. Cochinch.* ii (1790) 493.—A strong-smelling prostrate or suberect much-branched glabrous or sparsely woolly annual; stems 3–9 in. long, spreading from the root. Leaves $\frac{1}{4}$–$\frac{2}{3}$ in. long, oblong or oblong-lanceolate or obovate-oblong, narrowed at the base, sparingly irregularly toothed or almost pinnatifid, glabrous or rarely hairy. Heads $\frac{1}{8}$–$\frac{1}{4}$ in. diam., globose, solitary, axillary, sessile or rarely on very short peduncles; involucral bracts broadly oblong, membranous. Female florets very numerous; corolla minute, 4-lobed. Disc-florets few; corolla campanulate. Achenes tetragonous, slightly hairy.—*T. Kirk Students' Fl.* (1899) 329; *Cheesem. Man. N.Z. Fl.* (1906) 360. Myriogyne minuta *Less. in Linnaea* (1831) 219; *A. Cunn. Precur.* (1838) n. 444; *Raoul Choix* (1846) 45; *Hook. f. Fl. Nov. Zel.* i (1853) 130; *Benth. Fl. Austral.* iii (1866) 553. Cotula minuta *Forst. f. Prodr.* (1786) 57; *A. Rich. Fl. Nouv. Zel.* (1832) 235; *Hook. f. Handb. N.Z. Fl.* (1864) 144. Poisonous?

Artemisia minima (L.) 1753. Two vars. see T. Bailey

North and South Islands: Not uncommon from the North Cape to Central Otago. Sea-level to 2000 ft. January–March.

21. **ABROTANELLA** Cass. 1825.

Glabrous perennial herbs, always of small size, often moss-like. Leaves alternate, imbricate, quite entire. Heads small, solitary or crowded in little terminal corymbs, heterogamous and discoid. Involucre campanulate; bracts few, in about 2 series, nearly equal or the outer shorter. Receptacle small, naked. Female florets exterior, in 1 series, tubular, 3–4-toothed, fertile. Disc-florets hermaphrodite or male, tubular, 4-toothed. Anthers obtuse or shortly pointed at the base. Style-branches of the disc-florets very short, truncate. Achenes 4-angled or -ribbed, clavate, terete or compressed. Pappus wanting.

A small genus of about 14 species, most abundant in New Zealand, but also found in Australia and Tasmania, Fuegia, and the Falkland Islands. One species has also been described from Rodriguez. All the New Zealand species are endemic.

* Heads several in a small terminal cluster.

Leaves $\frac{1}{2}$–1 in., linear-spathulate. Heads on a short leafy peduncle. Achenes obovoid or tetragonous .. .. .. 1. *A. spathulata.*
Leaves $\frac{1}{4}$–$\frac{1}{3}$ in., narrow ovate or lanceolate. Heads almost hidden among the upper leaves. Achenes with 4 short horns .. 2. *A. rosulata.*

** Heads solitary.

Loosely tufted. Leaves $\frac{1}{2}$–3 in., linear. Scape slender, bracteate, $\frac{1}{2}$–3 in. Achenes clavate .. .. 3. *A. linearis.*
Much smaller, glabrous. Leaves $\frac{1}{2}$–$\frac{1}{2}$ in., very narrow-linear, acute. Scape $\frac{1}{2}$ in. long. Heads small, $\frac{1}{15}$ in. diam. .. 4. *A. filiformis.*
Forming broad flat patches. Leaves $\frac{1}{5}$–$\frac{1}{3}$ in., linear or linear-spathulate. Scapes $\frac{1}{4}$–$\frac{1}{2}$ in. .. .. 5. *A. caespitosa.*

Forming soft rounded patches. Leaves $\frac{1}{4}$–$\frac{1}{3}$ in., linear-subulate, broadest at the base. Achenes linear-clavate, 4-ribbed ..	6. *A. inconspicua.*
Densely tufted, $\frac{1}{2}$–1 in. high. Leaves narrow-linear, recurved. Achenes linear-clavate, 4-angled	7. *A. pusilla.*
Very minute. Stems $\frac{1}{5}$–$\frac{1}{4}$ in. Leaves $\frac{1}{7}$ in., linear-oblong, truncate, margins thickened. Achenes setose, with 4 long bristles	8. *A. muscosa.*
Leaves rosulate, $\frac{1}{2}$–$\frac{2}{3}$ in., narrow-cuneate, pilose, dentate at the tips, thin and membranous. Scapes several, $\frac{1}{2}$–$\frac{3}{4}$ in. Heads $\frac{1}{12}$–$\frac{1}{10}$ in., many-flowered	9. *A. Christenseni.*

1. **A. spathulata** *Hook. f. Handb. N.Z. Fl.* (1864) 139.—Stems short, loosely tufted, 1–3 in. long, branched, creeping at the base, erect above. Leaves crowded, spreading, $\frac{1}{2}$–1 in. long, $\frac{1}{10}$–$\frac{1}{6}$ in. broad, narrow linear-spathulate, acute or obtuse, narrowed to the base, 3–7-nerved, flat, coriaceous. Heads about $\frac{1}{8}$ in. long, in a small terminal corymb either raised on a short leafy peduncle or almost hidden amongst the upper leaves; involucral bracts 8–12, oblong, with 3 translucent nerves. Florets 8–12; disc-florets with a 4-angled corolla with 4 short erect teeth; corolla of the females tubular with a globose base and 4 short spreading teeth. Achenes of the female florets obovoid, compressed, with 3 cellular ribs; of the disc-florets tetragonous.—*T. Kirk Students' Fl.* (1899) 330; *Cheesem. Man. N.Z. Fl.* (1906) 361; *Subantarct. Is. N.Z.* ii (1909) 417. Trineuron spathulatum *Hook. f. Fl. Antarct.* i (1844) t. 17.

Auckland and Campbell Islands: Peaty soil from sea-level to 1500 ft., but not common below 500 ft., *Hooker, T. Kirk! Cockayne, B. C. Aston! J. S. Tennant! Buchanan!* and others. January–February. T. 76 · 589.

Specimens collected by Kirk at Carnley Harbour are much larger than those figured by Hooker. But others gathered by Aston and Tennant are smaller, with the inflorescence hidden among the uppermost leaves.

2. **A. rosulata** *Hook. f. Handb. N.Z. Fl.* (1864) 139.—A small much-branched densely tufted little plant $\frac{1}{2}$–$1\frac{1}{2}$ in. high. Leaves closely imbricate, spreading or recurved, the upper rosulate, $\frac{1}{4}$–$\frac{1}{3}$ in. long, narrow ovate or lanceolate, acute, rigid and coriaceous, concave above, nerved beneath. Heads $\frac{1}{10}$ in. long, in terminal clusters of 3–6 amongst the upper leaves; involucral bracts 8–10, linear-oblong, coriaceous, nerved. Florets 8–10; disc-florets with a 4-angled corolla with 4 short erect teeth; corolla of the female florets tubular with 4 spreading teeth. Achene oblong-obovoid, 4-angled, the angles produced upwards into short horns.—*T. Kirk Students' Fl.* (1899) 330; *Cheesem. Man. N.Z. Fl.* (1906) 361; *Subantarct. Is. N.Z.* ii (1909) 417. Ceratella rosulata *Hook. f. Fl. Antarct.* i (1844) 24, t. 18.

Campbell Island: Rocky places on the hills, above 800 ft. altitude, ascending to the summit of Mount Honey, alt. 1860 ft., not common, *Hooker, T. Kirk! Cockayne, R. M. Laing!*

Mainly distinguished from the preceding by the smaller size, smaller and broader rosulate leaves, and 4-horned achenes.

3. **A. linearis** *Bergg. in Minnesk. Fisiog. Sallsk. Lund.* viii (1877) 14, t. 3, f. 28–38.—Rhizome creeping, branched. Stems slender, tufted, leafy at the base, 1–4 in. high. Leaves radical, numerous, spreading, $\frac{1}{2}$–3 in. long, linear, often curved, obtuse, coriaceous, more or less pilose towards the sheathing base. Scapes slender, $\frac{1}{2}$–3 in. high, sometimes forked, with 2–5 linear obtuse bracts. Heads usually solitary, $\frac{1}{6}$–$\frac{1}{4}$ in. diam.; involucral bracts 8–14, linear-oblong, subacute, 3-nerved. Florets 20–24; females swollen at the base, deeply 4-lobed; disc-florets larger, tubular, with 4

short erect teeth. Achenes clavate, obtusely 4-gonous.—*T. Kirk in Trans. N.Z. Inst.* xxiv (1892) 420; *Students' Fl.* (1899) 331; *Cheesem. Man. N.Z. Fl.* (1906) 361; *Ill. N.Z. Fl.* i (1914) t. 109.

South Island: Not uncommon on the mountains from Nelson to Foveaux Strait; most plentiful on the western side of the central range; altitudinal range from 2500 to 4500 ft. Stewart Island: Not uncommon. Sea-level to 2500 ft. December–January.

4. **A. filiformis** *Petrie in Trans. N.Z. Inst.* xlvii (1915) 51.—A small laxly creeping or tufted glabrous plant; flowering stems few, scattered. Leaves few, very narrow-linear, $\frac{1}{3}$–$\frac{1}{2}$ in. long, erect or slightly curved, acute at the tip, narrowed at the base into a broad striate glabrous sheath, midrib obscure. Scapes slender, solitary, about $\frac{1}{2}$ in. long; bracts 4–6, very narrow-linear. Heads solitary, small, $\frac{1}{15}$ in. diam.; involucral bracts 8–10, narrow-oblong, obtuse or subacute, obscurely 3-nerved. Florets few, 5–6, not longer than the involucral bracts. Achenes clavate, narrowed at the base, distantly and obscurely ribbed.

Stewart Island: Head of Paterson's Inlet, *T. Kirk! Petrie!* Port Pegasus, *B. C. Aston!*

Very closely allied to *A. linearis*, and perhaps only a variety; but can be easily recognized by the much smaller size, more glabrous habit, narrower leaves with acute tips, smaller heads, and fewer florets.

5. **A. caespitosa** *Petrie ex T. Kirk in Trans. N.Z. Inst.* xxiv (1892) 420.—A small densely tufted moss-like plant, often forming broad flat patches; stems seldom more than $\frac{1}{2}$ in. high. Leaves numerous, spreading or recurved, $\frac{1}{5}$–$\frac{1}{3}$ in. long, linear or linear-spathulate, obtuse, sheathing at the base, rather fleshy, flat or slightly concave, margins scarious when young. Scapes very short, often almost wanting; bracts 1 or 2, linear. Heads solitary, $\frac{1}{10}$ in. diam.; involucral bracts about 8, linear-oblong, 3-nerved. Florets 5–8, precisely similar to those of *A. linearis*. Achenes clavate, obscurely tetragonous.—*T. Kirk Students' Fl.* (1899) 331; *Cheesem. Man. N.Z. Fl.* (1906) 362.

South Island: Nelson—Mount Arthur, Mount Owen, *T. F. C.* Canterbury—Mountains above the Broken River, Craigieburn Mountains, *Petrie! T. F. C.* Otago—Clarke's Diggings, Mount Ida, Mount Kyeburn, *Petrie!* 3000–6000 ft. December–January.

6. **A. inconspicua** *Hook. f. Handb. N.Z. Fl.* (1864) 140.—A densely tufted moss-like plant, forming soft rounded patches; stems $\frac{1}{2}$–2 in. long, densely leafy. Leaves numerous, spreading or ascending, $\frac{1}{4}$–$\frac{1}{3}$ in. long, linear-subulate, broad and membranous at the base, with ciliate margins, gradually tapering to a subacute thick and fleshy tip, rigid when dry. Head solitary, $\frac{1}{10}$–$\frac{1}{8}$ in. diam., sunk amongst the uppermost leaves; involucral bracts linear-oblong, obtuse, 3-nerved. Florets 15–20; female narrow-tubular, slightly swollen at the base, lobes 4, spreading; disc-florets larger, between funnel-shaped and tubular, with 5 short erect lobes. Achene linear-clavate, 4-ribbed.—*Buch. in Trans. N.Z. Inst.* xiv (1882) 354, t. 34, f. 1; *T. Kirk Students' Fl.* (1899) 331; *Cheesem. Man. N.Z. Fl.* (1906) 362.

South Island: Otago—Mount Alta, *Hector* and *Buchanan!* Black Peak, *A. McKay!* common on all the higher mountains of the interior, *Petrie!* 4000–6000 ft. December–January.

7. **A. pusilla** *Hook. f. Handb. N.Z. Fl.* (1864) 139.—A small densely matted moss-like plant, forming extensive carpets in peaty localities. Stems short, wiry, leafy, emitting long fibrous roots. Leaves crowded, spreading or recurved, $\frac{1}{2}$ in. long or more, narrow-linear, acute at the tip, rigid and coriaceous, flat or concave above, midrib prominent beneath. Head solitary, $\frac{1}{10}$ in. diam., sunk amongst the uppermost leaves or on very short stout peduncles; involucral bracts linear, obtuse, coriaceous, nerved. Style of the disc-florets bifid. Achenes of the female florets linear-clavate, 4-angled.—*T. Kirk Students' Fl.* (1899) 332; *Cheesem. Man. N.Z. Fl.* (1906) 362; *Ill. N.Z. Fl.* i (1914) t. 109, B. Trineuron pusillum *Hook. f. Fl. Nov. Zel.* i (1853) 131.

North Island: Peaty places on the Ruahine Mountains, *Colenso! B. C. Aston!* Tararua Mountains, Mount Holdsworth, *W. Townson!* Mount Hector, *Petrie! B. C. Aston!* 3000–5000 ft. December–February.

A. pusilla is chiefly distinguished from the other New Zealand species by its small size and densely matted habit, by the narrow-linear recurved leaves, acute at the tips, and by the linear-clavate 4-angled achenes.

8. **A. muscosa** *T. Kirk in Trans. N.Z. Inst.* xxiv (1892) 422, t. 36.—Stems very minute, $\frac{1}{5}$–$\frac{1}{4}$ in. high, either solitary or forming dense patches $\frac{1}{2}$–1 in. diam. Leaves closely imbricating, erect, $\frac{1}{8}$–$\frac{1}{7}$ in. long, linear or linear-oblong, truncate or retuse at the tip; upper $\frac{1}{2}$ excessively coriaceous and rigid, somewhat concave, margins much thickened and cartilaginous; lower $\frac{1}{2}$ membranous, sheathing. Heads minute, solitary, concealed amongst the uppermost leaves; involucral bracts 5, oblong, obtuse or acute or apiculate, nerveless or nearly so. Florets 4–8; females narrow, cylindrical, obscurely toothed at the mouth; disc-florets tubular, 4-toothed. Achenes oblong, truncate above, setose, obscurely tetragonous, with a long bristle at each angle.—*Students' Fl.* (1899) 332; *Cheesem. Man. N.Z. Fl.* (1906) 363.

Stewart Island: Summit of Rakiahua, alt. 2300 ft., *T. Kirk! Cockayne;* Table Hill, *Cockayne.* January–February.

A very remarkable little plant, closely allied to *A. emarginata* Cass., from the Falkland Islands. It is one of the smallest flowering plants in the Dominion, and in a barren state might easily be mistaken for a *Bryum* or *Tortula.*

9. **A. Christenseni** *Petrie in Trans. N.Z. Inst.* xlvii (1915) 51.—"Leaves radical, rosulate, $\frac{1}{2}$–$\frac{2}{3}$ in. long, $\frac{1}{6}$ in. broad, narrow-cuneate, thin, obtuse, shortly toothed at and near the tip, above sparsely clad with rather long slender hairs composed of a single row of cells; under-surface more glabrous except on the evident midrib. Scapes several, erect, simple, slender, sparsely pilose, with 2 usually opposite linear bracts near the base, maturing irregularly and in fruit elongating to $\frac{3}{4}$ in. Heads solitary, small, $\frac{1}{12}$–$\frac{1}{10}$ in. diam.; involucral bracts in 2 series, shortly oblong, obtuse, thin, crenately wavy at the top, the inner narrower; florets numerous, minute, not exceeding the involucre. Achenes 20 or fewer, linear-oblong, compressed, slightly thickened along the margin."

South Island: Nelson—Bare spots in grassy places, Hanmer Plains, *C. E. Christensen!*

A very curious and distinct plant, not at all resembling any of the other New Zealand species. Only 2 specimens, which have been kindly lent to me for examination by Mr. Petrie, have been found. I much regret that the material is insufficient to satisfy me that the species is a true *Abrotanella.*

22. **ERECHTITES** Rafin. 1817

Erect annual or perennial herbs, cottony or glabrous. Leaves alternate, toothed or lobed or pinnately divided, rarely entire. Heads narrow, in terminal corymbs, heterogamous and discoid. Involucre cylindric; bracts in 1 series, linear, equal, appressed, sometimes with a few small ones at the base. Receptacle flat, naked. Female florets in 2–3 rows at the circumference, very slender, filiform, minutely 3–5-toothed. Disc-florets hermaphrodite, fewer in number than the females, tubular with a broad 5-toothed mouth. Anthers obtuse at the base. Style-branches of the disc-florets elongated, truncate at the tip. Achenes linear-oblong, obtuse or contracted towards the apex, striate or angular. Pappus-hairs in many series, copious, soft, excessively slender.

A genus of about 15 species, mainly Australasian and South American; but one species is found in North America, and another in Java. Three of the New Zealand species extend to Australia and Tasmania; the remaining three are endemic.

* Involucral bracts 8–10.

Glabrous or nearly so. Leaves membranous, usually regularly denticulate .. .. 1. *E. prenanthoides.*

** Involucral bracts 10–14.

Cottony or woolly. Leaves linear-oblong, lobed or pinnatifid .. 2. *E. arguta.*
Scabrid with short white hairs. Leaves linear-oblong, lobed or pinnatifid .. .. 3. *E. scaberula.*
White with cottony tomentum. Leaves linear-elongate, entire or minutely remotely toothed; margins revolute .. .. 4. *E. quadridentata.*
Glabrous or nearly so. Leaves erect, lower oblong or linear-oblong, upper linear, entire or denticulate .. .. .. 5. *E. diversifolia.*
Glabrous or nearly so. Leaves spreading, membranous, pinnatifid or pinnate with a large terminal segment .. .. .. 6. *E. glabrescens.*

1. **E. prenanthoides** (A. Rich.) *DC. Prodr.* vi (1837) 296.—A tall erect annual or biennial herb 1–4 ft. high, simple or branched above, glabrous or slightly hairy. Leaves rather distant, 2–6 in. long or more, linear-oblong to lanceolate or linear-lanceolate, acuminate, lower petiolate, upper sessile with broad toothed auricles, membranous, regularly or irregularly closely and finely denticulate, rarely lobed. Corymbs very large, terminal, 6–12 in. across or more; pedicels slender, $\frac{1}{4}$–$\frac{1}{3}$ in. long. Heads quite glabrous, $\frac{1}{4}$ in. long; involucral bracts 8–10, narrow-linear, green with white margins. Florets 18–22; females more numerous than the hermaphrodite. Achenes linear-oblong, grooved, hairy, surmounted by a callous ring surrounding the base of the pappus.—*Hook. f. Fl. Nov. Zel.* i (1853) 141; *Handb. N.Z. Fl.* (1864) 156; *Benth. Fl. Austral.* iii (1866) 658; *T. Kirk Students' Fl.* (1899) 333; *Cheesem. Man. N.Z. Fl.* (1906) 364. Senecio prenanthoides *A. Rich. Sert. Astrol.* (1834) 96. S. heterophyllus *Col. in Trans. N.Z. Inst.* xxvii (1895) 389.

Kermadec Islands: Not uncommon on Sunday Island, *W. R. B. Oliver!* North and South Islands, Stewart Island, Chatham Islands: From Ahipara and Mangonui southwards, but rare and local to the north of the Thames Valley. Sea-level to 3000 ft. October–January. Also in Australia and Tasmania.

2. **E. arguta** (A. Rich.) *DC. Prodr.* vi (1837) 296.—A coarse erect annual herb 1–3 ft. high; stem stout, grooved, branched above, more or less cottony or woolly, rarely almost glabrous. Leaves 2–4 in. long, linear-oblong or lanceolate, acute or obtuse, lower usually contracted into a petiole, upper

sessile with a broad toothed stem-clasping base, coriaceous, coarsely and irregularly toothed or lobed or pinnatifid, lobes sinuate-dentate, upper surface glabrous or cobwebby, beneath more or less clothed with loose white cottony tomentum. Corymbs terminal, dense; pedicels slender, cottony. Heads $\frac{1}{4}$ in. long; involucral bracts 12–14, usually with a few minute ones at the base, narrow linear-lanceolate, woolly below. Florets 30–40; females much the most numerous. Achenes linear-oblong, grooved, hairy, crowned by a callous ring.—*Hook. f. Fl. Nov. Zel.* i (1853) 142; *Handb. N.Z. Fl.* (1864) 157; *Benth. Fl. Austral.* iii (1866) 659; *T. Kirk Students' Fl.* (1899) 334; *Cheesem. Man. N.Z. Fl.* (1906) 364. Senecio argutus *A. Rich. Fl. Nouv. Zel.* (1832) 258; *A. Cunn. Precur.* (1838) n. 466; *Raoul Choix* (1846) 45.

North and South Islands, Stewart Island: Abundant from the Three Kings Islands and the North Cape southwards. Sea-level to 2500 ft. November–February. Also in Australia and Tasmania.

A common plant, varying much in stature, degree of pubescence, and the extent to which the leaves are toothed or divided.

3. **E. scaberula** *Hook. f. Handb. N.Z. Fl.* (1864) 157.—A slender erect annual 1–2 ft. high; stem grooved, simple or branched above, rough with short white hispid hairs. Leaves 1–3 in. long, linear-oblong or lanceolate, acute or obtuse, lower petiolate, upper sessile with small stem-clasping auricles, coarsely and irregularly toothed or pinnatifid, lobes acute, again sharply toothed, both surfaces rough with short hispid hairs. Corymbs terminal, lax; pedicels slender, glabrous. Heads $\frac{1}{4}$ in. long; involucral bracts about 12, glabrous, subulate-lanceolate, acuminate, tips often recurved. Florets 20–30; females the more numerous. Achenes linear-oblong, grooved, hispid, crowned by a small callous ring.—*T. Kirk Students' Fl.* (1899) 334; *Cheesem. Man. N.Z. Fl.* (1906) 365. E. hispidula *Hook. f. Fl. Nov. Zel.* i (1853) 142 (*not of DC.*). E. pumila *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 338. Senecio hispidulus *A. Cunn. Precur.* (1838) n. 462 (*not of A. Rich.*).

North and South Islands, Stewart Island, Chatham Islands: Not uncommon from the North Cape southwards. Sea-level to 1500 ft. November–February.

4. **E. quadridentata** *DC. Prodr.* vi (1837) 295.—An erect herb 1–3 ft. high, usually much branched from a hard and woody base, everywhere more or less clothed with white cottony tomentum. Leaves 2–6 in. long, linear-elongate or linear-lanceolate, acuminate, lower sometimes petiolate, upper sessile, with or without small auricles at the base, entire or with a few distant teeth; margins revolute. Corymbs terminal, broad, lax. Heads $\frac{1}{3}$ in. long, involucral bracts 12–14, narrow linear-lanceolate, acuminate, glabrous or cottony, usually with a few minute ones at the base. Florets about 30, females the more numerous. Achenes linear-oblong, grooved and angled, hairy, abruptly contracted towards the tip, crowned by a callous ring.—*Hook. f. Fl. Nov. Zel.* i (1853) 142; *Handb. N.Z. Fl.* (1864) 157; *Benth. Fl. Austral.* iii (1866) 660; *T. Kirk Students' Fl.* (1899) 334; *Cheesem. Man. N.Z. Fl.* (1906) 365. Senecio quadridentatus *Lab. Pl. Nov. Holl.* ii (1806) 48, t. 194; *A. Cunn. Precur.* (1838) n. 461; *Raoul Choix* (1846) 45.

North and South Islands, Stewart Island, Chatham Islands: Abundant from the Three Kings Islands and the North Cape southwards. Sea-level to 3500 ft. November–January. Also in Australia and Tasmania.

5. **E. diversifolia** *Petrie in Trans. N.Z. Inst.* xix (1887) 324.—A slender erect annual herb 1–2½ ft. high. Stems grooved, glabrous or slightly cottony, simple or branched above. Leaves erect, 2–4 in. long; lower oblong or linear-oblong, narrowed into long petioles, obtuse, rather membranous, glabrous above, often puberulous beneath, entire or remotely and minutely denticulate; upper narrower, linear or linear-lanceolate, acute, sessile or nearly so, not auricled, glabrous or slightly cottony. Corymbs laxly and irregularly branched; pedicels slender, bracteate. Heads ¼ in. long; involucral bracts 12–14, linear-lanceolate, acute. Florets 30–40; females much the most numerous. Achenes linear-oblong, grooved, hispid, crowned with a callous ring.—*T. Kirk Students' Fl.* (1899) 335; *Cheesem. Man. N.Z. Fl.* (1906) 366.

North Island: Swamps at Karioi, base of Ruapehu, *Petrie!* South Island: Canterbury—Broken River basin and Mount Cook, *T. F. C.* Otago—Common in the interior, *Petrie!* Bluff Hill, *J. D. Enys.* Stewart Island: *T. Kirk.* Sea-level to 3000 ft. December–January.

Best distinguished by the almost glabrous habit and erect nearly entire membranous leaves.

6. **E. glabrescens** *T. Kirk in Trans. N.Z. Inst.* ix (1877) 550.—A slender erect annual 1–3 ft. high; stem grooved, simple or branched above, glabrous or nearly so. Leaves very variable in size and shape, 3–6 in. long, oblong or lanceolate-oblong, deeply pinnatifid with the segments irregularly sinuate-dentate, or pinnate with a large terminal leaflet and few or many much smaller lateral ones, lower petiolate, upper sessile with broad toothed auricles, membranous, often purple beneath, glabrous or nearly so. Corymbs lax. Heads ⅓ in. long; involucral bracts 10–12, linear, acuminate, green with white margins. Florets 20–30; females the most numerous. Achenes longer than any other New Zealand species, ⅛–⅐ in. long, pale, linear, glabrous, obscurely grooved, attenuated above, crowned with a callous ring.—*Students' Fl.* (1899) 335; *Cheesem. Man. N.Z. Fl.* (1906) 366; *Ill. N.Z. Fl.* i (1914) t. 110.

North Island: Scrub on the central volcanic plateau, *Cockayne, T. F. C.*; Erewhon, Upper Rangitikei, *Petrie!* South Island, Stewart Island: Not uncommon in mountain districts throughout. Ascends to 4500 ft.; descends to sea-level in Stewart Island. January–February.

A very distinct species, easily distinguished from the other species found in New Zealand. The habit is more slender, and it is almost entirely glabrous. The leaves are more membranous, and vary excessively in size and in the extent to which they are cut or divided; and the under-surface is frequently of a purplish colour.

23. **BRACHYGLOTTIS** Forst. 1776

Shrubs or small trees. Branches stout, spreading, densely clothed with white tomentum, as are the leaves beneath and branches of the inflorescence. Leaves large, irregularly lobed or sinuate. Heads small, very numerous, crowded in large much-branched terminal panicles, heterogamous, obscurely radiate. Involucre narrow; bracts in 1 series, linear, scarious, shining, usually with minute subulate scales at the base. Receptacle small, foveolate. Florets of the circumference female, irregularly lobed or 2-lipped; outer lobe or ligule broad, inner small, narrow, revolute. Disc-florets hermaphrodite, tubular with a campanulate 5-toothed mouth. Anthers obtuse at the base, entire. Style-branches of the hermaphrodite florets truncate, papillose at the tips. Achenes terete or obscurely angled, papillose. Pappus-hairs copious, in 1 series.

Brachyglottis arborescens Oliver
Col.by Baylis.Great Is. Three Kings.Dec.45.
Ak. Museum Records.Vol.3. nos.4-5. Dec.1948

A small genus of 2 (or more probably 1) species, confined to New Zealand. It differs from *Senecio* in habit, in the shape of the female corolla, and in the papillose achenes.

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Leaves larger, glossy. Involucres purplish, hardly shining 2. *B. Rangiora.*

B. rotundifolia p. 92.

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North and South Islands: Abundant from the North Cape as far south as Kaikoura and Greymouth. Sea-level to 2500 ft. *Pukapuka; Wharangitawhito.* August–October.

A common plant in the northern portion of the Dominion. It is said to be poisonous to cattle and horses.

2. **B. Rangiora** *Buch. in Trans. N.Z. Inst.* xiv (1882) 357.—Very similar to the preceding, but rather smaller, seldom more than 12 or 14 ft. high, with stouter branches and larger leaves. Leaves 6–15 in. long including the petiole, more coriaceous and glossy, sometimes unequal at the base; petiole longer and stouter, 3–5 in. long. Involucral bracts purplish, hardly shining. Female florets with the outer ligule entire.—*T. Kirk Students' Fl.* (1899) 336; *Cheesem. Man. N.Z. Fl.* (1906) 367.

North and South Islands: Shores of Cook Strait, *Buchanan! T. Kirk;* Westport, *Dr. Gaze!* Greymouth, *Helms.* *Rangiora.* July–September.

I consider this to be a trivial variety of *B. repanda*, from which it differs in no important character. But as both Kirk and Buchanan treated it as a distinct species, and as they were supported by the late Dr. Mantell, who had it in cultivation for many years, I have retained it for the present. It appears to keep its characters, such as they are, under cultivation.

24. **SENECIO** Linn. 1737

Herbs, shrubs, or small trees of exceedingly various habit, glabrous or pubescent or more or less woolly or tomentose. Leaves alternate, entire or variously divided. Heads solitary or corymbose or paniculate, heterogamous and radiate or homogamous and discoid. Involucre from cylindrical to hemispherical; bracts in 1 or 2 series, nearly equal, erect, free or connate below, usually with a few much shorter ones at the base. Receptacle flat or convex, naked, pitted or fimbrillate. Florets of the circumference female, ligulate, sometimes sterile or wanting. Disc-florets hermaphrodite, tubular, 5-toothed. Anthers obtuse at the base or minutely tailed. Style-branches of the hermaphrodite florets recurved, their tips truncate or penicillate. Achenes subterete, usually ribbed or striate. Pappus-hairs copious, soft, white, smooth or scabrid or barbellate.

5. **E. diversifolia** *Petrie in Trans. N.Z. Inst.* xix (1887) 324.—A slender erect annual herb 1–2½ ft. high. Stems grooved, glabrous or slightly cottony, simple or branched above. Leaves erect, 2–4 in. long; lower oblong or linear-oblong, narrowed into long petioles, obtuse, rather membranous, glabrous above, often puberulous beneath, entire or remotely and minutely denticulate; upper narrower, linear or linear-lanceolate, acute, sessile or nearly so, not auricled, glabrous or slightly cottony. Corymbs laxly and irregularly branched; pedicels slender, bracteate. Heads ¼ in. long; involucral bracts 12–14, linear-lanceolate, acute. Florets 30–40; females much the most numerous. Achenes linear-oblong, grooved, hispid, crowned with a callous ring.—*T. Kirk Students' Fl.* (1899) 335; *Cheesem. Man. N.Z. Fl.* (1906) 366.

North Island: Swamps at Karioi, base of Ruapehu, *Petrie!* South Island: Canterbury—Broken River basin and Mount Cook, *T. F. C.* Otago—Common in the interior, *Petrie!* Bluff Hill, *J. D. Enys.* Stewart Island: *T. Kirk.* Sea-level to 3000 ft. December–January.

Best distinguished by the almost glabrous habit and erect nearly entire membranous leaves.

6. **E. glabrescens** *T. Kirk in Trans. N.Z. Inst.* ix (1877) 550.—A slender erect annual 1–3 ft. high; stem grooved, simple or branched above, glabrous or nearly so. Leaves very variable in size and shape, 3–6 in. long, oblong or lanceolate-oblong, deeply pinnatifid with the segments irregularly sinuate-dentate, or pinnate with a large terminal leaflet and few or many much smaller lateral ones, lower petiolate, upper sessile with broad toothed auricles, membranous, often purple beneath, glabrous or nearly so. Corymbs lax. Heads ⅓ in. long; involucral bracts 10–12, linear, acuminate, green with white margins. Florets 20–30; females the most numerous. Achenes longer than any other New Zealand species, ⅛–⅐ in. long, pale, linear, glabrous, obscurely grooved, attenuated above, crowned with a callous ring.—*Students' Fl.* (1899) 335; *Cheesem. Man. N.Z. Fl.* (1906) 366; *Ill. N.Z. Fl.* i (1914) t. 110.

North Island: Scrub on the central volcanic plateau, *Cockayne, T. F. C.*; Erewhon, Upper Rangitikei, *Petrie!* South Island, Stewart Island: Not uncommon in mountain districts throughout. Ascends to 4500 ft.; descends to sea-level in Stewart Island. January–February.

A very distinct species, easily distinguished from the other species found in New Zealand. The habit is more slender, and it is almost entirely glabrous. The leaves are more membranous, and vary excessively in size and in the extent to which they are cut or divided; and the under-surface is frequently of a purplish colour.

23. BRACHYGLOTTIS Forst. 1776

Shrubs or small trees. Branches stout, spreading, densely clothed with white tomentum, as are the leaves beneath and branches of the inflorescence. Leaves large, irregularly lobed or sinuate. Heads small, very numerous, crowded in large much-branched terminal panicles, heterogamous, obscurely radiate. Involucre narrow; bracts in 1 series, linear, scarious, shining, usually with minute subulate scales at the base. Receptacle small, foveolate. Florets of the circumference female, irregularly lobed or 2-lipped; outer lobe or ligule broad, inner small, narrow, revolute. Disc-florets hermaphrodite, tubular with a campanulate 5-toothed mouth. Anthers obtuse at the base, entire. Style-branches of the hermaphrodite florets truncate, papillose at the tips. Achenes terete or obscurely angled, papillose. Pappus-hairs copious, in 1 series.

A small genus of 2 (or more probably 1) species, confined to New Zealand. It differs from *Senecio* in habit, in the shape of the female corolla, and in the papillose achenes.

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24. **SENECIO** Linn. 1737

Herbs, shrubs, or small trees of exceedingly various habit, glabrous or pubescent or more or less woolly or tomentose. Leaves alternate, entire or variously divided. Heads solitary or corymbose or paniculate, heterogamous and radiate or homogamous and discoid. Involucre from cylindrical to hemispherical; bracts in 1 or 2 series, nearly equal, erect, free or connate below, usually with a few much shorter ones at the base. Receptacle flat or convex, naked, pitted or fimbrillate. Florets of the circumference female, ligulate, sometimes sterile or wanting. Disc-florets hermaphrodite, tubular, 5-toothed. Anthers obtuse at the base or minutely tailed. Style-branches of the hermaphrodite florets recurved, their tips truncate or penicillate. Achenes subterete, usually ribbed or striate. Pappus-hairs copious, soft, white, smooth or scabrid or barbellate.

S. cochlearis Sat. 72:37.
" cockaynei " 38
" bennettii 39

The largest genus of *Compositae*, if not of flowering plants generally, probably containing fully 1,000 species. It is found in all parts of the world, stretching from the Equator to the limits of phaenogamic vegetation in both the Arctic and Antarctic regions, but is most abundant in temperate and mountainous districts. Few of the species have wide ranges, and many have a very restricted distribution. Of the 30 found in New Zealand, one extends to Australia, the rest are all endemic. The herbaceous species are exceedingly variable, and some of them difficult to determine; but the shrubby varieties are remarkably distinct. Some of them, such as *S. Hectori* and *S. Kirkii*, must be ranked amongst the most beautiful members of the flora.

A. Perennial or rarely annual herbs.

* Herbs with broad radical leaves and naked simple or branched scapes. Involucral bracts in 2 series.

Leaves 3–7 in., broadly oblong or orbicular-oblong, thick and coriaceous; upper surface densely silky or villous, bristles if present confined to the margins or a narrow space within them; under-surface densely tomentose .. .. 1. *S. saxifragoides.*

Leaves 1–5 in., broadly oblong, cordate at the base; upper surface with bristles over almost the whole surface, white and tomentose beneath. Scape glandular-tomentose .. .. .. 2. *S. lagopus.*

Leaves 2–5 in., broadly oblong, both surfaces clothed with snow-white tomentum .. .. 3. *S. Haastii.*

Leaves ¾–4 in., broadly oblong to linear-oblong, often narrowed at the base, membranous or subcoriaceous, rugose and bristly above, glabrate beneath. Scape cottony .. .. .. 4. *S. bellidioides.*

Leaves 2–5 in., broadly oblong, membranous or subcoriaceous, purplish beneath, glabrate or slightly silky-tomentose above and below. Scape silky-tomentose, glandular .. .. 5. *S. southlandicus.*

** Herbs with erect leafy stems, corymbose above. Involucral bracts in 2 series.

Stems 6–14 in. Leaves 2–10 in. by $\frac{1}{12}$–¼ in. Corymbs large; heads 1–1½ in. diam. Flowers always yellow .. .. 6. *S. Lyallii.*

Stems 6–14 in. Leaves 3–8 in. by ¼–¾ in. Corymbs larger. Flowers variable in colour, white to yellow or pale-salmon .. 7. *S. scorzoneroides.*

*** Herbs with branched leafy stems. Heads corymbose. Involucral bracts in 1 series.

Stems stout, fistulose, 1–2 ft. Leaves 2–5 in., deeply pinnatifid, rather fleshy, mealy-tomentose beneath. Heads corymbose, ⅓–½ in. diam., rays wanting .. .. 8. *S. antipodus.*

Glabrous or pubescent. Stems stout or slender, 1–2 ft. Leaves 1–2 in., toothed or lobed or pinnatifid, rather fleshy. Heads ⅓–¾ in. diam., rays usually present .. .. .. 9. *S. lautus.*

Pubescent. Lower leaves broad, membranous, narrowed into slender petioles; upper sessile, auricled at the base. Heads with short broad rays .. .. 10. *S. radiolatus.*

Everywhere glaucous. Stems numerous, 1–3 ft. Leaves 2–4 in., obovate-spathulate, sinuate-toothed. Heads ⅓–½ in. diam., radiate .. .. 11. *S. glaucophyllus.*

Tall, erect, much branched, glabrous, 2–4 ft. high. Leaves 2–8 in., ovate-oblong, membranous, toothed or lobed or pinnatifid. Heads ½–¾ in., radiate .. .. .. 12. *S. latifolius.*

Stems 2–6 ft., decumbent and naked at the base. Leaves with petioles 6–12 in.; blade 4–7 in., orbicular-cordate; margins spinulose-serrate. Heads ¾–1¼ in., radiate .. .. 13. *S. Turneri.*

Tall, stout, erect, glabrous, 2–5 ft. Leaves 2–5 in., oblong or linear-oblong, coriaceous, often glaucous, sinuate-dentate. Heads ¼–⅓ in., radiate .. .. 14. *S. Banksii.*

Erect, branched, 1–2 ft., clothed with white cobwebby tomentum. Leaves 1–4 in., oblong-ovate to lanceolate, toothed or lobed or pinnatifid. Heads ⅓–½ in., radiate .. .. .. 15. *S. Colensoi.*

S. spedeni Petrie 55 : 434.
S. matthewsii "

B. Shrubs or small trees.

* Heads radiate, rays white.

Thinly tomentose. Leaves 6–12 in., oblong-lanceolate or oblong-ovate, acutely toothed, with a few small pinnae at the base. Heads large, 1–2 in. diam. .. .. 16. *S. Hectori.*

Perfectly glabrous. Leaves 2–5 in., lanceolate to broad-obovate, rather fleshy, entire or sinuate-dentate. Heads large, ½–2 in. diam. .. .. 17. *S. Kirkii.*

Tomentose and glandular. Leaves 3–7 in., oblong-lanceolate, coarsely dentate, white and silky beneath. Heads small, ⅓ in. diam. .. .. 18. *S. myrianthos.*

** Heads radiate, rays yellow.

Climbing; branches flexuose, slender. Leaves 1–2 in., orbicular, toothed. Heads ⅓ in. diam. .. .. 19. *S. sciadophilus.*

Erect, bushy, 2–6 ft. Leaves 1–2 in., oblong, crenate-toothed. Heads ½ in. diam. .. .. 20. *S. perdicioides.*

Shrub or small tree, 6–20 ft. Leaves 2–4 in., elliptic-lanceolate or -oblong, entire, fulvous beneath. Heads ½–¾ in.; rays broad .. .. 21. *S. Huntii.*

Shrub or small tree, 6–25 ft. Leaves 3–7 in., lanceolate or elliptic-lanceolate, entire, white beneath. Heads ½–¾ in., rays narrow, contorted .. .. 22. *S. Stewartiae.*

Diffuse shrub, 1–4 ft. Leaves 1–3 in., elliptic-lanceolate, acute at both ends, entire, white beneath. Panicle narrow, lax. Heads few, ¾ in. diam. .. .. 23. *S. laxifolius.*

Spreading shrub, 2–8 ft. Leaves 1½–3½ in., oblong-ovate, entire, softly cottony beneath. Corymb broad, dense. Heads numerous, ¾–1 in. diam. .. .. 24. *S. Greyii.*

Compact shrub 2–4 ft. Leaves ¾–1½ in., oblong or obovate, obscurely crenulate, white beneath. Racemes few-flowered. Heads ¾–1 in. diam. .. .. 25. *S. compactus.*

Much-branched shrub 2–6 ft. Leaves ½–1½ in., narrow oblong-obovate, wrinkled and crenate, white beneath. Corymbs many-flowered. Heads ½–⅔ in. diam. .. .. .. 26. *S. Monroi.*

Much-depressed shrub 6–8 in. high. Leaves ¾–1½ in. long. Peduncles with a single head .. .. 27. *S. lapidosus.* 375

Small shrub ½–1½ ft. Leaves viscid, 1–2½ in., oblong-lanceolate, flat. Corymb dense, leafy, tomentose. Heads ½–¾ in. diam. 28. *S. revolutus.*

Robust much-branched shrub 3–5 ft. Leaves 1–2 in., oblong, excessively viscid and coriaceous; margins recurved. Corymb lax, glabrous, viscid. Heads ¾ in. diam. .. .. .. 29. *S. Adamsii.*

Much-branched shrub 1–2 ft. Leaves 1 × 1/12 in., narrow-linear; margins revolute to the midrib. Head 1 in. diam., solitary on a leafy peduncle .. .. 30. *S. bifistulosus.*

Closely branched shrub 4–10 ft. Leaves ⅙–¼ in., linear-oblong. Head solitary, sessile, ⅓ in. diam. .. .. 31. *S. cassinioides.*

*** Heads discoid; ray wanting.

Small branching shrub. Leaves 4–5 in., broadly elliptic, firm but not coriaceous, thinly tomentose, petiole equalling the blade. Inflorescence lateral near the ends of the branches .. 32. *S. remotifolius.*

Branching shrub 4–10 ft. Leaves 2–6 in., obovate or oblong-lanceolate, tomentose beneath. Panicle large. Heads ⅓ in. diam. .. .. 33. *S. elaeagnifolius.*

Shrub or small tree 6–30 ft. Leaves 2–5 in., orbicular or nearly so. Panicles large. Heads ⅓ in. diam. .. .. .. 34. *S. rotundifolius.*

Small compact shrub 1–3 ft. Leaves ½–2 in., oblong, very coriaceous. Corymbs usually dense. Heads ¼–⅓ in. diam. .. 35. *S. Bidwillii.*

S. Pottsii J. B. Armstr. in Trans. N.Z. Inst. iv (1872) 290 is quite unknown to me, and there are no specimens in any Dominion herbaria. It is described as a small slender suffruticose species with decumbent flexuose branches 3–6 in. long, the branches, petioles, and leaves beneath clothed with loose white cottony tomentum. Leaves

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petiolate, ½–1 in. long, ovate or spathulate, glabrous above, crenate. Heads solitary, ⅓ in. long, on slender bracteate peduncles; involucral bracts 15–20, linear, obtuse, cottony.—Mount Jollie, Rangitata district, alt. 4500 ft.

S. Christensenii Cockayne in Trans. N.Z. Inst. xlix (1917) 60 is a species described from a single imperfect specimen gathered by Mr. C. E. Christensen on the Leslie Hills, Hanmer. Through the kindness of Dr. Cockayne I have had an opportunity of examining the type, which must clearly be placed in the neighbourhood of *S. lagopus*; but the specimen is much too incomplete to warrant any further conclusions.

S. dimorphocarpos Col. in Trans. N.Z. Inst. xxvi (1894) 316 is *S. jacobaea* Linn., the common ragwort of the Northern Hemisphere, which has become naturalized in many districts in both the North and South Islands. It is a tall almost glabrous perennial 2–4 ft. high, with irregularly pinnatifid or 2-pinnatifid leaves 2–6 in. long, a dense corymb of rather large heads ⅔–1 in. diam., bright-yellow rays, and glabrous ribbed achenes.

S. areolatus Col. *l.c.* 317 is *S. sylvaticus* Linn., another common northern plant which has become established in New Zealand. An annual slightly glandular-pubescent herb 1–3 ft. high, with irregularly pinnatifid leaves 1–3 in. long, loose corymbs of small heads ⅓ in. diam., with very short revolute rays and silky ribbed achenes.

Several other species of *Senecio* have become naturalized, the most widely distributed being *S. vulgaris* Linn., the common groundsel, which can be recognized by its small size, 6–12 in. high, succulent grooved stems often branched from the base, irregularly pinnatifid or toothed leaves, small cylindric heads with the florets all tubular and hermaphrodite, and an involucre of about 20 equal bracts.

1. **S. saxifragoides** *Hook. f. Fl. Nov. Zel.* i (1853) 144. — Rootstock short, stout, as thick as the thumb, densely clothed with soft brownish wool. Leaves all radical, spreading; blade 3–7 in. long, 3–5 in. broad, broadly oblong or orbicular, obtuse or rounded at the tip, rounded or slightly cordate at the base, sometimes oblique, thick and coriaceous or occasionally almost fleshy, entire or crenulate; upper surface densely covered when young with soft white silky hairs, which are often sparingly mixed with stout bristles (glandular hairs) along the margins or for a little distance within them; under-surface densely covered with thick white tomentum; but both surfaces glabrate and rugose when old; petioles stout, clothed with long white hairs mixed with purplish bristles. Scapes 1–1½ ft. high, stout, branched, densely covered with white woolly tomentum copiously mixed with purplish jointed hairs tipped with purplish-black glands; bracts linear or linear-oblong, white and woolly. Heads 4–12, ¾–1½ in. diam.; involucral bracts linear, acute, tomentose and glandular. Achenes linear, grooved, glabrous, ⅓ in. long.—*Handb. N.Z. Fl.* (1864) 159; *T. Kirk Students' Fl.* (1899) 339; *Cheesem. Man. N.Z. Fl.* (1906) 372; *A. Wall in Trans. N.Z. Inst.* l (1918) 198.

See Wall Rec. c. M. 4:1936: 113

South Island: Canterbury—Rocky places on the Port Hills, to the north-west of Port Lyttelton, stretching from Cooper's Knob to Mount Pleasant, *Lyall, Haast! T. Kirk! T. F. C., A. Wall!* and many others. Reported from Kaikoura Peninsula by H. J. Matthews, but specimens not in a satisfactory state. January–March.

A very handsome plant, but one which can with difficulty be separated from large states of *S. lagopus*. Previous writers, while acknowledging the close relationship of the two species, have until quite lately agreed in considering that *S. saxifragoides* could always be separated from *S. lagopus* by wanting the stiff bristles (glandular hairs) usually so plentiful on the upper surface of the leaves of that plant. But Professor A. Wall, in a memoir entitled "On the Distribution of *Senecio saxifragoides* and its Relations to *Senecio lagopus*" (Trans. N.Z. Inst. l (1918) 198) has brought forward a great mass of evidence satisfactorily proving that although the bristles are occasionally absent in *S. saxifragoides*, yet they are present in many plants of that species. They are not, however, distributed over almost the whole surface, as in *S. lagopus*, but usually occur all round the margin, or occupy an area of variable width just within it. I am indebted to Professor Wall for giving me full opportunities of examining the material upon which his conclusions are based.

Professor Wall's memoir must considerably affect our opinions as to the specific distinctness of *S. saxifragoides*. On the whole, however, I still regard it as distinct from *S. lagopus*, separated mainly by the larger size, stouter habit, more copious villous hairs, larger thicker leaves, and by the different arrangement of the bristles, when such are present.

2. **S. lagopus** *Raoul in Ann. Sci. Nat.* Ser. iii, 2 (1844) 119, t. 18.—Rootstock stout, densely clothed towards the top with long brownish silky wool. Leaves all radical, crowded, spreading; blade 1–5 in. long, ¾–3 in. broad, broadly oblong, rounded at the tip, usually cordate at the base, margins entire or crenulate; upper surface rugose, when young more or less covered (especially near the margins and upper part of the blade) with numerous stout bristles (glandular hairs), and which are often mixed with white silky hairs; under-surface covered with copious thick white tomentum; both surfaces becoming glabrate when old; petioles ½–4 in. long, stout or slender, densely covered with long white hairs mixed with purplish bristles. Scapes or peduncles 1–12 in. high, simple or much branched, more or less tomentose and glandular pilose; bracts few, linear, obtuse. Heads 1 to many, ½–1 in. diam., yellow; involucral bracts linear, glandular and tomentose. Rays ½–1 in. long, spreading. Achenes linear, glabrous.—*Choix* (1846) 21, t. 17; *Hook. f. Fl. Nov. Zel.* i (1853) 143; *Handb. N.Z. Fl.* (1864) 158; *T. Kirk Students' Fl.* (1899) 338; *Cheesem. Man. N.Z. Fl.* (1906) 370; *A. Wall in Trans N.Z. Inst.* l (1918) 198.

North and South Islands: Not uncommon from Taupo and the Ruahine Mountains to the south of Canterbury. Sea-level to 4500 ft. November–February.

An exceedingly variable plant. The type of the species, as described and figured by Raoul in his "Choix des Plantes," certainly comes very close to large states of *S. saxifragoides*, but can usually be distinguished by a combination of characters pointed out in my description of that plant. But in high inland localities in both the North and South Islands Raoul's type appears to pass into forms differing in their smaller size, more slender habit, and smaller flower-heads. These again vary in one direction towards *S. bellidioides*, and less frequently in another direction towards *S. Haastii*.

3. **S. Haastii** *Hook. f. Handb. N.Z. Fl.* (1864) 159.—Rootstock stout or slender, more or less clothed at the top with soft whitish wool. Leaves all radical; blade 2–5 in. long, broadly oblong or orbicular-oblong, obtuse at the tip, rounded or slightly cordate at the base, subcoriaceous, obscurely crenulate, both surfaces covered with soft white lax or appressed tomentum, or the upper surface hoary-tomentose or almost glabrate; petioles slender, 2–6 in. long, white and cottony. Scapes slender, 5–15 in. high, simple or branched, cottony and slightly glandular; pedicels long, slender; bracts few, linear or linear-obovate. Heads 1–8, ¾–1½ in. diam.; involucral bracts linear-oblong, subacute, white and cottony. Achenes narrow-linear, glabrous.—*T. Kirk Students' Fl.* (1899) 339; *Cheesem. Man. N.Z. Fl.* (1906) 371.

South Island: Nelson—Clarence Valley, *T. F. C.* Canterbury—Broken River, *J. D. Enys! T. Kirk! T. F. C.*; Mount Cook district, abundant, *Haast! T. F. C.*; Lake Tekapo, *T. F. C.*; shores of Lake Ohau and sources of the Ahuriri, *Haast!* Otago—Lake Hawea, *Haast*; not uncommon on the mountains of the interior, *Hector* and *Buchanan! Petrie! J. Speden! Poppelwell.* 1500–4000 ft. December–February. Upper Rangitata: Wall: Rec. C.M. 4: 1935: 113

4. **S. bellidioides** *Hook. f. Fl. Nov. Zel.* i (1853) 144.—Very similar to *S. lagopus*, but smaller and more slender. Leaves all radical, spreading; blade ¾–4 in. long, broadly oblong to linear-oblong, obtuse or subacute,

rounded or slightly cordate at the base or narrowed into the petiole, membranous or subcoriaceous, entire or crenulate, upper surface rugose or almost flat, more or less covered with short stiff bristles, beneath glabrate or sparingly clothed with white or brownish tomentum; petioles long or short, usually woolly. Scapes 1–12 in. high, simple or branched, cottony or glandular-pubescent, rarely glabrate; bracts few, small, acute. Heads 1 to many, ½–1 in. diam.; involucral bracts tomentose or glabrate. Achenes linear, glabrous.—*Handb. N.Z. Fl.* (1864) 159; *T. Kirk Students' Fl.* (1899) 338; *Cheesem. Man. N.Z. Fl.* (1906) 371. S. Traversii *F. Muell. in Trans. Bot. Soc. Edinb.* vii (1861) 154.

Var. **glabratus** *T. Kirk l.c.*—Leaves broadly oblong, glabrous beneath, sparingly setose above.

Var. **angustatus** *T. Kirk l.c.*—Leaves linear-oblong, apex rounded or subacute.

South Island, Stewart Island: Not uncommon in mountain districts throughout. Ascends to 5000 ft.; descends almost to sea-level in Stewart Island. December–February. Var. *glabratus:* Wangapeka Valley, *T. F. C.*; Cass River, *Cockayne* and *Foweraker*. Var. *angustatus:* Buller Gorge, Mount Rochfort, Mount Frederic, *W. Townson!* Arthur's Pass, *T. F. C.*, *Cockayne!*

Very closely allied to *S. lagopus*, but in its usual state can generally be distinguished by the smaller size and more membranous leaves, which are often quite glabrous beneath, seldom tomentose.

5. **S. southlandicus** *Cockayne in Trans. N.Z. Inst.* xlvii (1915) 118.—Rootstock stout, usually clothed with pale-buff or purplish tomentum. Leaves all radical, crowded, spreading or suberect; blade 2–5 in. long, broadly oblong or almost orbicular, obtuse or rounded at the apex, cordate or truncate at the base, membranous or subcoriaceous; glabrate or slightly silky-tomentose above, sometimes sparsely mixed with stoutish bristles; usually purplish beneath, glabrate or slightly silky-tomentose; petiole long, silky-tomentose. Peduncles or scapes 5–12 in. long, branched, more or less silky-tomentose below, sometimes glandular-pilose. Heads 5–12, ½–1½ in. diam.; involucral scales linear, obtuse; margins purplish, glabrate; centre tomentose, often glandular. Achenes linear, glabrous.

South Island: Otago—Open tussock country to the south of the Clutha River, not uncommon, *Cockayne! Poppelwell! Petrie!* Probably has a much wider range. December–February.

This would probably have been better treated as a form of *S. bellidioides*.

6. **S. Lyallii** *Hook. f. Fl. Nov. Zel.* i (1853) 146.—A leafy herb 1–1½ ft. high or more, usually glandular-pubescent or almost villous, rarely glabrate. Rootstock thick, crowned with long silky hairs. Stem stout or slender, simple, erect, terminating in a broad corymb of many flower-heads. Leaves numerous, quite entire; lower 2–10 in. long, $\frac{1}{12}$–¼ in. broad, linear or narrow-linear, acute or acuminate, contracted or petiolate above the sheathing villous base, 1–5-nerved; cauline gradually becoming smaller, sessile, amplexicaul, tapering from the base to the apex. Corymbs usually large and broad; peduncles 1–5 in. long, slender, simple, bracteate. Heads large, 1–2½ in. diam.; involucral bracts in 1 series, linear, pubescent or glabrate. Ray-florets ½–1 in. long, yellow, spreading. Achenes linear, silky, ribbed. Pappus-hairs unequal, rigid, scabrid.—*Hook. f. Handb. N.Z. Fl.* (1864) 160; *T. Kirk Students' Fl.* (1899) 339; *Cheesem. Man. N.Z. Fl.* (1906) 372.

South Island: Not uncommon from Nelson to Foveaux Strait. Stewart Island: Extremely plentiful in bogs. Ascends to nearly 5000 ft.; descends almost to sea-level in Stewart Island. December–February. T.71:97.

A striking plant, although not so handsome as *S. scorzoneroides*. On the mainland of New Zealand it is by no means so abundant as that species, but apparently it is the commoner of the two in Stewart Island.

7. **S. scorzoneroides** *Hook. f. Fl. Nov. Zel.* i (1853) 146.—Glandular-pubescent in all its parts. Rootstock stout, crowned with the silky bases of the fallen leaves. Stem robust, simple, erect, 6–14 in. high, terminating in a broad corymb of many flower-heads. Lower leaves rosulate, 3–8 in. long, $\frac{1}{4}$–$\frac{3}{4}$ in. broad, linear-lanceolate to oblong- or ovate-lanceolate, acute or acuminate, somewhat thick, 3–9-nerved, margins flat, entire. Cauline leaves shorter and broader, more acuminate, the upper more glandular-pubescent. Corymbs very large and broad; peduncles often very numerous, long, slender, bracteate. Heads large, 1–2 in. diam. or even more; involucral bracts linear-lanceolate, acute, densely glandular-pubescent. Ray-florets long, slender, variable in colour, white to yellow or pale-salmon. Pappus of rigid dirty-white unequal scabrid hairs. Achene narrow-linear, silky, ribbed.—S. Lyallii *var.* scorzoneroides *T. Kirk Students' Fl.* (1899) 339; *Cheesem. Man. N.Z. Fl.* (1906) 372; *Ill. N.Z. Fl.* i (1914) t. 111.

South Island, Stewart Island: Not uncommon from the north of the Nelson Province southwards to Foveaux Strait and Stewart Island, but most abundant in the central and western portions of the Southern Alps. Descends to sea-level or nearly so in the sounds of south-west Otago; ascends to quite 5000 ft. in the Southern Alps. December–February. see Trans. 72. 35 or 38.

One of the most beautiful and charming members of the subalpine flora of New Zealand. Very closely allied to *S. Lyallii*, and in the first edition of this work I followed Sir J. D. Hooker in treating it as a variety. But it differs markedly in the greater size, broader leaves, and larger heads, which range in colour from white to yellow or bright-salmon. In typical *S. Lyallii* the heads are always yellow.

8. **S. antipodus** *T. Kirk in Trans. N.Z. Inst.* xxiii (1891) 440 (*name only*).—An erect much-branched annual or biennial herb 1–2 ft. high; stems stout, fistulose, $\frac{1}{3}$–$\frac{1}{2}$ in. diam.; branches spreading, grooved. Leaves membranous, rather succulent, 2–5 in. long, lower narrowed into a petiole, upper sessile with broad amplexicaul auricles, deeply and irregularly pinnatifid; segments few, 1–2 in. long, acute, toothed or lobed or almost pinnatifid, glabrous above, mealy-tomentose beneath. Corymbs terminal; peduncles slender, bracteate. Heads numerous, discoid, $\frac{1}{3}$–$\frac{1}{2}$ in. diam.; involucre broad, campanulate; bracts about 20, in 1 series, linear-lanceolate, acute, 2-ribbed, margins scarious. Florets all hermaphrodite, very numerous, funnel-shaped. Achenes linear-oblong, grooved, glabrous or minutely puberulous.—*Students' Fl.* (1899) 341; *Cheesem. Man. N.Z. Fl.* (1906) 372.

Antipodes Island: Abundant over the greater part of the island, *T. Kirk! Cockayne! B. C. Aston!*

A remarkably distinct species, not closely allied to any of the New Zealand forms. Kirk compares it with the Fuegian *S. candidans*, and no doubt there is a resemblance in the inflorescence and discoid heads; but *S. candidans* has ovate leaves with crenate-toothed margins, widely different in appearance to the deeply pinnatifid leaves of *S. antipodus*.

S. cochlearis S+T. 72:37 Ohikanui R

Sol. ex n. 538. nom. nud.

9. **S. lautus** *Forst. f. Prodr.* (1786) 91. — An exceedingly variable much or sparingly branched glabrous or pubescent annual or biennial herb 6–24 in. high; stems stout or slender, erect or decumbent or almost prostrate, grooved, flexuose. Leaves 1–2 in. long, linear or linear-lanceolate, more rarely broader and lanceolate or linear-oblong to oblong, either narrowed into a petiole or dilated with stem-clasping auricles at the base, entire or remotely toothed or lobed or pinnatifid; lobes narrow or broad. Heads in few- or many-flowered corymbs, $\frac{1}{3}$–$\frac{3}{4}$ in. diam., campanulate; involucral bracts herbaceous, linear, acute, pubescent at the tips, usually prominently 2-ribbed; outer bracts few, small. Ray-florets 10–15, with spreading or revolute ligules, rarely absent. Disc-florets numerous, scarcely longer than the involucre. Achenes linear, grooved, pubescent or nearly glabrous. Pappus-hairs copious, soft, white.—*A. Rich. Fl. Nouv. Zel.* (1832) 257; *A. Cunn. Precur.* (1838) n. 457; *Raoul Choix* (1846) 45; *Hook. f. Fl. Nov. Zel.* i (1853) 145; *Handb. N.Z. Fl.* (1864) 160; *Benth. Fl. Austral.* iii (1866) 667; *T. Kirk Students' Fl.* (1899) 341; *Cheesem. Man. N.Z. Fl.* (1906) 373. S. neglectus *A. Rich. l.c.* 258. S. angustifolius *Forst. f. Prodr.* (1786) 91.

Kermadec Islands, North and South Islands, Stewart Island: Abundant near the sea, not so common inland. Sea-level to 4500 ft. October–March.

This is a widely diffused plant in Australia and Tasmania as well as New Zealand, and is everywhere exceedingly variable, not a few forms having been described as distinct species. The chief varieties found in New Zealand may be briefly characterized as follows, but it must be borne in mind that intermediates are not uncommon:—

Var. **a.**—Much branched, erect or decumbent. Leaves deeply pinnatifid; segments long and narrow, often again toothed, rarely short and broad. Heads $\frac{1}{3}$–$\frac{1}{2}$ in. diam., radiate. Usually near the coast, but occasionally found inland. Mr. Kirk's variety *carnosulus* is probably a form of this.

Var. **montanus.**—Sparingly branched or quite simple, erect. Leaves oblong to lanceolate or spathulate, entire or toothed or shortly pinnatifid. Heads $\frac{1}{2}$–$\frac{3}{4}$ in. diam., radiate; rays often revolute. A common mountain-plant in both the North and South Islands.

Var. **discoideus.**—Sparingly branched, prostrate or decumbent, rarely erect. Leaves very fleshy, obovate or spathulate, coarsely toothed or lobed, sometimes pinnatifid below. Heads large, $\frac{1}{2}$–$\frac{3}{4}$ in. diam.; rays wanting. Mountain districts in the South Island.

10. **S. radiolatus** *F. Muell. Veg. Chath. Is.* (1864) 24, t. 4.—Stems stout, erect or decumbent at the base, glabrescent or almost hispid in old specimens, branches grooved. Lower leaves membranous, broadly cuneate-ovate in outline, narrowed into slender petioles, toothed, lobed or pinnatifid; lobes obtuse, pubescent beneath. Upper leaves sessile, auricled at the base, entire below the middle, toothed, lobed or pinnatifid above, teeth acute; under-surface of leaves often with cobwebby pubescence. Inflorescence terminal, corymbose; heads numerous, $\frac{1}{3}$ in. long, cylindric or narrow-campanulate; involucral bracts linear or linear-lanceolate, glabrous or pubescent at the tips. Rays short, broad. Achenes oblong-lanceolate, excessively mucilaginous when placed in warm water.—S. lautus *var.* radiolatus *T. Kirk Students' Fl.* (1899) 341; *Cheesem. Man. N.Z. Fl.* (1906) 374.

Chatham Islands: Sandy places near the beach, *H. H. Travers! F. A. D. Cox* and *Cockayne!*

Very close to *S. lautus*, but perhaps sufficiently distinct to be kept up as a separate species.

11. **S. glaucophyllus** *Cheesem. in Trans. N.Z. Inst.* xxviii (1896) 536.—Smooth and glaucous, perfectly glabrous, 1–3 ft. high. Rootstock stout, woody. Stems numerous, strongly grooved, simple or sparingly branched, naked at the base or with minute scale-like leaves only, leafy above. Leaves 2–4 in. long, ½–1 in. wide, oblanceolate or oblong-obovate or obovate-spathulate, obtuse or subacute, gradually narrowed into broad flat petioles, not dilated nor sheathing at the base, irregularly sinuate-dentate or serrate, rather thin, very glaucous; margins somewhat thickened. Upper leaves narrower, lanceolate or linear-lanceolate, serrate, gradually passing into narrow-linear entire bracts. Heads several in a loose terminal corymb, broadly campanulate, ⅓ in. diam.; involucral bracts linear, acuminate, 2-ribbed, glabrous or pilose at the tips. Ray-florets about 15; disc-florets numerous. Achenes narrow-linear, deeply grooved, finely scabrid.—*T. Kirk Students' Fl.* (1899) 343; *Cheesem. Man. N.Z. Fl.* (1906) 374.

South Island: Nelson—Mount Arthur, on limestone rocks, alt. 4000 ft., *T. F. C., F. G. Gibbs!* January–February.

A very curious plant, its bushy mode of growth and glaucous leaves giving it a very different appearance from any of its allies. The stems appear to die down to the root in winter, a fresh crop appearing in the following spring. So far, it has only been found in the one locality.

S. Solanderi Allan, Trans 65 229

12. **S. latifolius** *Banks and Sol. ex Hook. f. Fl. Nov. Zel.* i (1853) 145.—A tall erect much-branched glabrous herb 2–4 ft. high; stems flexuous, grooved. Leaves membranous, 2–8 in. long, very variable in shape; lower on long winged petioles with or without small toothed auricles at the base, blade broadly oblong or ovate-oblong to linear-oblong, toothed or lobulate or irregularly lyrate-pinnatifid; upper sessile, ovate-oblong to linear-oblong, coarsely toothed or lobed, often contracted below the middle and then expanding into broad toothed auricles; uppermost leaves linear-lanceolate, acute, serrate or dentate. Corymbs broad, lax, much branched; branches slender. Heads very numerous, ½–¾ in. diam.; involucral bracts in 1 series, linear, acuminate, glabrous or pubescent. Ray-florets 12–20; ligule narrow, spreading. Disc-florets 30–40. Achenes linear, grooved, hispidulous. Pappus-hairs soft, copious, white.—*Hook. f. Handb. N.Z. Fl.* (1864) 159; *T. Kirk Students' Fl.* (1899) 341; *Cheesem. Man. N.Z. Fl.* (1906) 374.

Var. **rufiglandulosus** *T. Kirk l.c.*—Glandular-pubescent or glabrate. Leaves coarsely and sharply irregularly doubly dentate or serrate, sometimes lobed at the base. Corymbs very large. Achenes densely pubescent.—S. rufiglandulosus *Col. in Trans. N.Z. Inst.* xxviii (1896) 599.

Var. **sinuatifolius** *T. Kirk l.c.*—Stems slender, flexuose. Leaves distant, ovate-oblong, sinuate, not toothed. Corymbs small; heads few.

North Island: From the Paparata Valley and Waikato River southwards, but rare and local to the north of the East Cape. South Island: Western part of the Nelson Provincial District and Westland, not uncommon as far south as Ross. Sea-level to 3500 ft. November–February.

13. **S. Turneri** *Cheesem. in Trans. N.Z. Inst.* xliii (1911) 176.—A stout glabrous herb 2–6 ft. high. Stem as thick as the finger, woody, prostrate or decumbent and usually naked at the base, leafy above, sparingly branched at the top only. Leaves alternate, large, spreading, bright-green; petiole 6–12 in. long, winged at the base and broadly amplexicaul, smooth and terete above; blade 4–7 in. long by 3–6 in. across, cordate to orbicular-cordate, deeply lobed at the base, acute at the tip, thin and membranous,

veins reticulate, margins sinuate and finely spinulose-serrate. Cauline leaves smaller, on shorter petioles, with large leafy auricles and smaller narrower blades, gradually passing into lanceolate or linear entire bracts. Corymbs large and broad, much branched; branches slender. Heads very numerous, $\frac{3}{4}$–$1\frac{1}{4}$ in. diameter, bright-yellow; involucral bracts in a single series, linear or oblong-linear, acute, glabrous or finely pubescent. Ray-florets 10–15; ligule narrow, spreading; disc-florets 25–35. Ripe achenes not seen. Pappus soft, copious, white.

North Island: Faces of wet cliffs by the Upper Wanganui River, both above and below the junction of the Mangaio Stream, also along the middle portion of the Mokau River, *E. Phillips Turner! B. C. Aston!* December–January.

A most distinct species. Although allied to *S. latifolius* it differs widely in habit, in the large cordate leaves, which are never lobulate or pinnatifid, but have their margins finely spinulose-serrate, in the long terete petioles, and in the larger flower-heads.

14. **S. Banksii** *Hook. f. Fl. Nov. Zel.* i (1853) 146.—An erect stout or slender perfectly glabrous branched herb 2–4 ft. high or more; stems flexuose, grooved. Leaves 2–5 in. long, 1–2 in. broad, broadly oblong or ovate-oblong to linear-oblong, acute or subacute, sessile with broad auricled amplexicaul bases, coriaceous or almost membranous, shining, often glaucous, coarsely and irregularly sinuate-serrate or dentate; veins reticulated, often prominent beneath; uppermost leaves smaller and narrower, lanceolate or linear. Corymbs broad, lax. Heads numerous, campanulate, $\frac{1}{4}$–$\frac{1}{3}$ in. broad; involucral bracts linear-oblong, acuminate, pubescent at the tips. Ray-florets 10–12; ligules short, revolute. Achenes linear, grooved, pubescent.—*Handb. N.Z. Fl.* (1867) 734; *T. Kirk Students' Fl.* (1899) 342; *Cheesem. Man. N.Z. Fl.* (1906) 375. S. odoratus *Hook. f. Handb. N.Z. Fl.* (1864) 160 (*not of Hornemann*). S. pumiceus *Col. in Trans. N.Z. Inst.* xxi (1889) 89; *T. Kirk l.c.* 343.

Var. **angustatus.**—Much less robust and more rigid, glabrous or sparingly clothed with short scabrid hairs. Leaves $1\frac{1}{2}$–3 in. long, $\frac{1}{4}$–$\frac{3}{4}$ in. broad, lanceolate or oblong-lanceolate, acute, all sessile or the lower sometimes petiolate, coriaceous, sharply and irregularly sinuate-serrate; veins usually prominent beneath.—S. Banksii *var.* scabrosus *Hook. f. Fl. Nov. Zel.* i (1853) 147. S. pumiceus *var.* angustatus *T. Kirk Students' Fl.* (1899) 343.

North Island: Mokohinou Island, *Herb. Col. Mus.!* Mercury Bay, *Banks* and *Solander;* East Cape Island, *Ross;* Anaura and Tolaga Bay, *Banks* and *Solander, Bishop Williams! Adams* and *Petrie!* near Table Cape, *A. Hamilton!* between Tolaga Bay and Gisborne, *Colenso.* Var. *angustatus:* East Cape, *A. Hamilton;* Karangahake Cliffs, Lake Taupo, *T. F. C.* Sea-level to 1500 ft. December–January.

Mr. Kirk limits *S. Banksii* to a form with more decidedly flexuous stems and rather membranous glaucous leaves, keeping up Colenso's *S. pumiceus* for the reception of those states with stouter and straighter stems and more coriaceous leaves. But a series of the Tolaga Bay plant, which is that collected by Banks and Solander, shows that this distinction cannot possibly be maintained, some of the specimens exactly matching the types of *S. pumiceus* in Mr. Colenso's herbarium, while others show a regular gradation to more slender and membranous forms. An examination of the ripe achenes of both varieties also proves that the supposed difference in size and shape does not exist.

15. **S. Colensoi** *Hook. f. Fl. Nov. Zel.* i (1853) 147.—An erect much or sparingly branched herb 10–20 in. high, more or less clothed with white cobwebby tomentum. Stems woody at the base, flexuose, grooved. Leaves very variable, 1–4 in. long, $\frac{1}{2}$–$1\frac{1}{2}$ in. broad, broadly oblong or obovate to lanceolate, obtuse or acute, sessile with broad amplexicaul bases or petiolate with auricles at the base of the petioles, coriaceous; margins sinuate-dentate or serrate or deeply irregularly lobulate or pinnatifid, hoary or

cobwebby on both surfaces or on the lower surface only. Corymbs terminal, usually lax. Heads few or many, $\frac{1}{3}$–$\frac{1}{2}$ in. diam., campanulate; involucral bracts linear-oblong, acute or acuminate. Rays short, revolute. Achenes slender, grooved, silky or hispid.—*Handb. N.Z. Fl.* (1864) 160; *T. Kirk Students' Fl.* (1899) 342; *Cheesem. Man. N.Z. Fl.* (1906) 375.

North Island: Usually on cliffs near the sea. Bay of Islands, *Colenso;* East Cape, *Colenso;* near Napier, *Bishop Williams! A. Hamilton!* Cape Kidnappers, *Colenso, T. Kirk!* Waipawa, *Petrie!* Patangata, *Tryon!* Cape Turnagain, *B. C. Aston!* November–January.

16. **S. Hectori** *Buch. in Trans. N.Z. Inst.* v (1873) 348; vi (1874) t. 23.—An erect branching shrub 6–12 ft. high; branches stout, spreading, tomentose. Leaves crowded near the tips of the branches, 6–12 in. long, 2–4 in. broad, oblong-lanceolate or elliptic-lanceolate or narrow oblong-ovate, acute, narrowed to the base, membranous, scaberulous above, thinly clothed with white cottony tomentum beneath, acutely toothed, pinnatifid or pinnate for a short distance at the very base; petiole very short. Corymbs large, lax, terminal, much branched, often 1 ft. or more across; peduncles and pedicels clothed with short stiff glandular pubescence. Heads large, 1–2 in. diam., broadly campanulate; involucral bracts in 2 series, outer lanceolate, inner broader and oblong-lanceolate, acute; margins broad, membranous. Ray-florets 8–12; ligules broad, spreading, white. Disc-florets numerous. Achenes linear, grooved, glabrous. Pappus-hairs rigid, scabrid.—*T. Kirk Students' Fl.* (1899) 344; *Cheesem. Man. N.Z. Fl.* (1906) 376; *Ill. N.Z. Fl.* i (1914) t. 112.

South Island: Nelson—Collingwood, *Hector, W. T. L. Travers;* between Takaka and Riwaka, *T. Kirk;* sources of the Takaka, Upper Motueka and its tributaries, *T. F. C.;* Upper Buller Valley, *McGregor, Hector! T. Kirk!* Westland—Valley of the Grey, *T. Kirk.* 250–3500 ft. December–February.

One of the finest species of the genus, well marked off from any other by a small portion of the very base of the leaf being pinnatifid or pinnate, all the remainder being dentate. The heads are sometimes as much as $2\frac{1}{2}$ in. diam.

17. **S. Kirkii** *Hook. f. ex T. Kirk Students' Fl.* (1899) 344.—An erect perfectly smooth and glabrous branching shrub 6–12 ft. high; branches stout, brittle. Leaves very variable in size and shape, 2–5 in. long, $\frac{1}{3}$–2 in. broad, lanceolate or obovate-lanceolate to oblong-ovate or rhomboid-ovate, acute or obtuse, entire or sinuate-dentate, rather fleshy, narrowed into a short slender petiole or cuneate at the base. Corymbs large, often much branched, 4–12 in. diam. or more; branches spreading; lower bracts foliaceous. Heads numerous, large, campanulate, $1\frac{1}{2}$–2 in. diam.; involucral bracts in 2 series, linear-oblong, acute, margins membranous. Ray-florets few; ligules long, white, spreading, $\frac{3}{4}$–1 in. long. Disc-florets with a campanulate 5-toothed limb. Achenes linear, grooved, glabrous, slightly expanded and thickened at the tip. Pappus-hairs rigid, scabrid.—*Cheesem. Man. N.Z. Fl.* (1906) 376. S. glastifolius *Hook. f. Fl. Nov. Zel.* i (1853) 147, t. 39; *Handb. N.Z. Fl.* (1864) 161 (*not of Linn. f.*). Solidago arborescens *A. Cunn. Precur.* (1838) n. 435 (*not of Forst.*).

Druce: 1916: 646 makes S. neozelandicum

North Island: Common in hilly and wooded districts from the North Cape to Wellington. Sea-level to 2500 ft.

A very remarkable and beautiful species. The flower-heads are often so abundantly produced as to conceal the leaves, the multitude of snow-white rays then rendering the plant conspicuous from afar. In the northern forests it is often epiphytic on the distorted trunks of the rata (*Metrosideros robusta*). In Kauri forests it is invariably terrestrial.

18. **S. myrianthos** *Cheesem. in Trans. N.Z. Inst.* vii (1875) 348.—A small sparingly branched shrub 3–12 ft. high; bark black; branches slender, when young clothed with thin buff tomentum. Leaves 3–7 in. long, oblong-lanceolate or elliptic-lanceolate, acute or acuminate, usually unequal and often slightly cordate at the base, sharply and coarsely doubly dentate, thin and membranous, glabrous above when mature, beneath clothed with silvery-white appressed tomentum, veins reticulated; petioles slender, 1–2 in. long. Panicles large, terminal, often more than 2 ft. long; peduncles and pedicels slender, everywhere densely covered with short spreading purplish-brown glandular hairs; lower bracts often foliaceous, upper subulate. Heads numerous, $\frac{1}{3}$ in. long, obconic; involucral bracts about 8, linear-oblong, obtuse, membranous, glabrous or nearly so. Ray-florets 4–6, white; ligules very short and broad, $\frac{1}{8}$ in. long. Disc-florets about 6; limb narrow-campanulate, 5-toothed. Achenes oblong, grooved, minutely hispidulous. Pappus-hairs in 1 series, minutely scabrid.—*T. Kirk Students' Fl.* (1899) 346; *Cheesem. Man. N.Z. Fl.* (1906) 377. S. Cheesemanii *Hook. f. in Ic. Plant.* (1877) t. 1201.

North Island: Ravines on the Cape Colville Peninsula, from Coromandel to Tairua and Waitekauri, *T. F. C., Adams!* Sea-level to 750 ft. November–December.

A handsome and distinct species, well characterized by the membranous leaves, large elongated panicles, and small white ray-florets. The flowers are deliciously sweet-scented.

19. **S. sciadophilus** *Raoul in Ann. Sci. Nat.* Ser. iii, 2 (1844) 119.—A slender climbing shrub 3–15 ft. high; branches flexuose, often pendent, striate, clothed with short pubescence. Leaves distant, spreading, 1–2 in. long; blade about $\frac{1}{2}$ the length, orbicular or orbicular-ovate, coarsely toothed, membranous, clothed on both surfaces with short scattered hairs or glabrate; veins reticulated. Heads $\frac{1}{3}$ in. diam., in few-flowered axillary or terminal corymbs, often forming an elongated terminal panicle; pedicels slender, pubescent. Involucre campanulate; bracts few, 6–8, linear-oblong, subacute; margins scarious. Ray-florets 4–7; ligule $\frac{1}{5}$ in. long, yellow, revolute. Disc-florets 6–10; limb broadly campanulate, deeply 5-lobed. Achenes grooved, glabrous or sparingly hispidulous. Pappus-hairs in several series, rigid, minutely denticulate.—*Choix* (1846) 21, t. 18; *Hook. f. Fl. Nov. Zel.* i (1853) 150; *Handb. N.Z. Fl.* (1864) 161; *T. Kirk Students' Fl.* (1899) 345; *Cheesem. Man. N.Z. Fl.* (1906) 377.

South Island: Nelson—Riwaka, *Spencer!* Wairoa Gorge, *Bryant.* Canterbury—Akaroa and other localities in Banks Peninsula, once abundant but now fast becoming scarce, *Raoul, T. Kirk! J. B. Armstrong! Cockayne, R. M. Laing!* Alford Forest, *J. D. Enys!* Mount Peel, *W. Barker, H. H. Allan!* forest near Waimate, *Foweraker.* Otago—Not uncommon in the vicinity of Dunedin, *Thomson! Petrie!* Sea-level to 2000 ft. January–April. Karamea: see Nat. Rec. C.M 4: 1955: 103

20. **S. perdicioides** *Hook. f. Fl. Nov. Zel.* i (1853) 149.—A small round-topped branching shrub 2–6 ft. high; branches slender, grooved, pubescent, scarred where the leaves have fallen away. Leaves 1–2 in. long, oblong or elliptic-oblong to ovate-oblong, obtuse, membranous, crenate-serrate or dentate, quite glabrous; veins reticulated; petioles slender. Corymbs leafy, terminating the branches; pedicels slender, pubescent. Heads turbinate, $\frac{1}{3}$ in. long; involucral bracts about 5, oblong, obtuse, with broad scarious margins. Ray-florets 2 or 3, rarely more, yellow; ligule oblong,

spreading. Disc-florets 4–8; limb funnel-shaped, deeply 5-lobed. Achenes oblong, grooved, glabrous or nearly so. Pappus-hairs in 2 series, rigid, minutely scabrid.—*Handb. N.Z. Fl.* (1864) 161; *T. Kirk Students' Fl.* (1899) 345; *Cheesem. Man. N.Z. Fl.* (1906) 378. S. multinerve *Col. in Trans. N.Z. Inst.* xxv (1893) 330. S. distinctus *Col. l.c.* xxvii (1895) 390.

North Island: From Hicks Bay and the East Cape southwards to Mahia Peninsula, not uncommon in forests. *Raukumara.* November–January.

A handsome little shrub, not closely allied to any other New Zealand species. First collected by Banks and Solander at Tolaga Bay during Cook's first voyage.

21. **S. Huntii** *F. Muell. Veg. Chath. Is.* (1864) 23, t. 3.—A shrub or small round-headed tree 6–20 ft. high, usually more or less glandular-pubescent and viscid in all its parts; branchlets marked with the scars of the fallen leaves. Leaves crowded, 2–4 in. long, elliptic-lanceolate or elliptic-oblong to linear-obovate, obtuse or acute, narrowed to a sessile base, entire, glabrous or nearly so above, usually clothed with thin fulvous tomentum beneath; margins flat or subrevolute; midrib prominent beneath. Panicle terminal, large, dense, much branched, 3–5 in. broad; pedicels slender, densely glandular-hirsute. Heads $\frac{1}{2}$–$\frac{3}{4}$ in. diam.; involucral bracts about 12, linear-oblong, obtuse or acute, membranous, glandular, villous at the tips. Ray-florets 15–20, yellow; ligule broad, revolute. Disc-florets numerous; limb campanulate, 5-lobed. Achenes oblong, grooved, glabrous. Pappus-hairs in 2 series, slender, scabrid.—*Hook. f. Handb. N.Z. Fl.* (1867) 734; *T. Kirk Students' Fl.* (1899) 346; *Cheesem. Man. N.Z. Fl.* (1906) 378.

Chatham Islands: Not uncommon in forests, *H. H. Travers! G. Mair! F. A. D. Cox! Cockayne! Rautini.* December–February.

This forms a handsome small tree, seldom exceeding 20 ft. in height. The leaves are pale shining-green above and greyish-green beneath; and the flowers are bright-yellow, usually produced in great abundance.

22. **S. Stewartiae** *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 339.—A shrub or small tree 6–25 ft. high; trunk 8–24 in. diam.; branches spreading, marked with the scars of the fallen leaves. Leaves crowded at the ends of the branches, 3–7 in. long, lanceolate or elliptic-lanceolate, acute or acuminate, narrowed to a broad sessile base, quite entire, subcoriaceous, glabrous above, clothed with thin appressed white tomentum beneath; veins reticulated. Panicles terminal, erect, 4–9 in. long; peduncles and pedicels densely glandular-pubescent, lower bracts foliaceous. Heads numerous, $\frac{1}{2}$–$\frac{3}{4}$ in. diam.; involucral bracts about 12, linear-oblong, obtuse, glandular-pubescent. Ray-florets 12–15, yellow; ligules narrow, contorted. Disc-florets 20–30; limb campanulate, 5-lobed. Achenes oblong, grooved, glabrous. Pappus-hairs dirty-white, short, scabrid.—*Cheesem. Man. N.Z. Fl.* (1906) 378; *Subantarct. Is. N.Z.* ii (1909) 418. S. Muelleri *T. Kirk in Trans. N.Z. Inst.* xv (1883) 360; *Students' Fl.* (1899) 346.

The Snares, The Solanders, Herekopere, and other Small Islands in Foveaux Strait: *C. Traill, T. Kirk, Chapman, Poppelwell.* December–February.

Closely allied to *S. Huntii*, from which it differs in the broader more acuminate leaves, with much white tomentum beneath, and in the narrow contorted ray-florets. The restricted geographical range of many species of *Senecio* has often been remarked; but hardly any instance is more striking than that of the present species, which is confined to a few small rocky islets individually not much more than a square mile in area.

S. spedeni Petrie } Trans 55 : 1924 : 434
S. matthewsii " }

23. **S. laxifolius** *Buch. in Trans. N.Z. Inst.* ii (1870) 89.—A small diffusely branched shrub 1–4 ft. high; branchlets, leaves beneath, and inflorescence densely clothed with white cottony tomentum. Leaves usually close-set, on slender petioles ½–1½ in. long; blade 1–2½ in., lanceolate or oblong-lanceolate or elliptic-lanceolate, acute at both ends, glabrous above or slightly cottony when young, coriaceous, quite entire. Panicle terminal, long and narrow, lax; peduncles and pedicels slender, cottony; lower bracts foliaceous. Heads ¾ in. diam., broad-campanulate; involucral bracts 12–15, linear-oblong, acute, tomentose, with broad scarious margins. Ray-florets 12–15, long and narrow, yellow. Disc-florets numerous. Achenes oblong, grooved, glabrous.—*T. Kirk Students' Fl.* (1899) 347; *Cheesem. Man. N.Z. Fl.* (1906) 379.

South Island: Nelson—Mount Arthur and Mount Owen, *T. F. C.*; Motueka Hills, *Cockayne*; Wairau Gorge, *T. F. C., Bryant*; Spenser Mountains, *F. R. Gibbs!* Discovery Peaks, *W. T. L. Travers*; Fowler's Pass, *T. Kirk!* 2000–3500 ft. December–February. Wall Rec. C.M. 4:1935 113

24. **S. Greyii** *Hook. f. Fl. Nov. Zel.* i (1853) 148, t. 38.—A small spreading shrub 2–8 ft. high; branches stout, woody, terete; branchlets, under-surface of leaves, and petioles densely clothed with appressed soft white tomentum. Leaves on slender petioles ½–1½ in. long; blade 1½–3½ in., oblong or oblong-ovate, obtuse, rounded and often unequal at the base, coriaceous, quite entire, upper surface glabrous except a cottony line at the margin; midrib prominent beneath. Corymbs large, terminal, 2–5 in. broad, much branched; peduncles and pedicels glandular-pubescent; bracts numerous, the lower ones foliaceous; the upper narrower, lanceolate or linear. Heads campanulate, ¾–1 in. diam.; involucral bracts about 15, linear or linear-oblong, membranous, acute, glandular-pubescent. Ray-florets 12–15, yellow; ligules spreading, ⅓–½ in. long. Disc-florets numerous; limb campanulate, 5-lobed. Achenes linear, densely silky. Pappus-hairs in several series, white, rigid, scabrid.—*Handb. N.Z. Fl.* (1864) 161; *T. Kirk Students' Fl.* (1899) 347; *Cheesem. Man. N.Z. Fl.* (1906) 379.

North Island: Wellington—Faces of cliffs from the Pahau River to Cape Palliser, rare and local, *Colenso, T. Kirk! B. C. Aston!* Sea-level to 1500 ft. December–February.

A handsome species, nearest to *S. laxifolius*, but at once separated by the larger obtuse leaves, dense corymbs, glandular-pubescent involucral bracts, and silky achenes.

25. **S. compactus** *T. Kirk in Trans. N.Z. Inst.* xii (1880) 395.—A small much-branched compact shrub 2–3 ft. high and 3–6 ft. diam.; branches, petioles, leaves beneath, and inflorescence densely clothed with appressed snow-white tomentum. Leaves on slender petioles ¼–½ in. long; blade ¾–1½ in., obovate or oblong-obovate, obtuse, rounded or narrowed at the base, coriaceous, glabrous above except a cottony line at the margin, obscurely crenulate or sinuate. Heads broadly campanulate, ¾–1 in. diam., in 4–8-flowered terminal leafy racemes; involucral bracts about 12, linear, acute, densely tomentose. Ray-florets about 12, yellow; ligules broad, spreading. Disc-florets very numerous; limb funnel-shaped, 5-toothed. Achenes linear, grooved, silky. Pappus-hairs white, minutely scabrid.—*Students' Fl.* (1899) 349; *Cheesem. Man. N.Z. Fl.* (1906) 380.

North Island: Wellington — Limestone cliffs near Castlepoint, *T. Kirk!* January–February.

Closely allied to *S. Monroi*, but differing in the larger broader leaves with smoother and whiter tomentum beneath, narrow few-flowered inflorescence, and the white cottony tomentum of the pedicels and involucral bracts. A handsome plant, with a very restricted distribution.

26. **S. Monroi** *Hook. f. Fl. Nov. Zel.* ii (1855) 333.—A much-branched woody shrub 2–6 ft. high; branchlets, petioles, and leaves beneath clothed with appressed whitish tomentum. Leaves shortly petioled, ½–1½ in. long, narrow-oblong or oblong-obovate, obtuse, narrowed into the petiole, coriaceous, glabrous above; margins wrinkled and crenate. Corymbs terminal, lax, leafy, slightly viscid; peduncles clothed with white tomentum; pedicels slender, glandular-pubescent. Heads numerous, broadly turbinate, ½–⅔ in. diam.; involucral bracts 10–15, linear, acute, membranous, glandular-pubescent. Ray-florets 10–15, yellow; ligules ¼ in. long, broad, revolute. Disc-florets numerous; limb funnel-shaped, 5-toothed. Achenes linear, grooved, hispid with short white hairs. Pappus-hairs white, slender, minutely scabrid.—*Handb. N.Z. Fl.* (1864) 162; *T. Kirk Students' Fl.* (1899) 348; *Cheesem. Man. N.Z. Fl.* (1906) 380.

South Island: Nelson—Wangapeka, *Kingsley!* Jollie's Pass, *T. F. C.* Marlborough—From Mount Blairich and the Awatere Valley southwards to the Conway and Mason Rivers, not uncommon, *Monro, H. H. Travers! T. Kirk! Cockayne,* and others. 1000–4500 ft. December–February.

27. **S. lapidosus** *Cheesem. in Trans. N.Z. Inst.* xlviii (1916) 213.—A small depressed much-branched prostrate shrub, forming dense clumps 6–8 in. high and 8–10 in. diam. Branches many, closely compacted, stout and woody at the base, and covered with a pale flaky bark; branchlets ascending or suberect, leafy, densely woolly-tomentose. Leaves ¾–1½ in. long, ⅓–½ in. broad, narrow-oblong or narrow elliptic-ovate, rarely oblong-spathulate, obtuse, coriaceous, margins minutely crenate, upper surface thinly covered with cobwebby tomentum, beneath clothed with dense silvery-white tomentum; petioles somewhat slender, broader at the base. Peduncles from the tips of the branchlets, stout or slender, 1–2 in. long, densely silvery-tomentose; bracts numerous, linear or linear-oblong. Heads solitary, turbinate, ⅓–⅔ in. diam.; involucral bracts 12–15, linear, acute, densely tomentose. Ray-florets 12–15, yellow; disc-florets numerous. Achenes linear, longitudinally grooved, hispid.

South Island: North Canterbury—Faces of rocky cliffs at Hell's Gate, Mason River, *H. J. Matthews!*

This interesting plant was collected by the late Mr. H. J. Matthews in 1909 in the gorge of the Mason River, North Canterbury, where it was associated with *Epilobium brevipes, Veronica rupicola,* and other species. So far as I know, it has not been found elsewhere. It is clearly allied to *S. Monroi,* but is a much smaller and more compactly branched plant; and the peduncles are simple with a single terminal head, whereas in *S. Monroi* the inflorescence is copiously corymbosely branched.

28. **S. revolutus** *T. Kirk Students' Fl.* (1899) 348.—A small robust shrub 6–20 in. high; branches stout, often decumbent at the base, suberect above. Leaves viscid, on petioles ⅓–¾ in. long; blade 1–2½ in., oblong-lanceolate or elliptic-lanceolate to elliptic-oblong, obtuse, narrowed into the petiole, quite entire, coriaceous, glabrous and reticulated above, beneath clothed with pale-buff or white appressed viscid tomentum. Corymb terminal, dense, about 2 in. diam., on a long and stout peduncle clothed with ascending linear-oblong foliaceous bracts; peduncle and pedicels tomentose. Heads 5–15, campanulate, ½–¾ in. diam.; involucral bracts linear, acute, tomentose and viscid. Ray-florets 10–15, yellow; ligules broad, revolute. Disc-florets numerous; limb campanulate, 5-toothed. Achenes linear-oblong, grooved, glabrous.—*Cheesem. Man. N.Z. Fl.* (1906) 381. S. robustus *Buch. in Trans. N.Z. Inst.* vi (1874) 243 (*not of Sch. Bipont.*).

South Island: Otago—Ben Lomond, Mount Bonpland, and other high peaks to the west, *Petrie!* mountains above Lake Harris, *T. Kirk!* Mackinnon's Pass, *F. R. Gibbs!* Routeburn, *Poppelwell!* Lake Hauroko, *J. Crosby Smith;* Eyre Mountains and the Garvie Mountains, *Poppelwell;* Mount Eglinton, *Morton!* 3000–4500 ft. January–March.

T. 71: 98.

29. **S. Adamsii** *Cheesem. in Trans. N.Z. Inst.* xxviii (1896) 536.—A small robust much-branched shrub 3–5 ft. high; young branches, leaves, and inflorescence excessively viscid. Leaves shortly petiolate, 1–2 in. long, oblong or oblong-obovate, obtuse, quite entire, extremely thick and coriaceous, glabrous above, beneath covered, except the midrib, with dense white or pale-buff closely appressed tomentum; margins revolute. Corymbs terminal, few-flowered, laxly branched; peduncles and pedicels nearly glabrous but excessively viscid; bracts varying from oblong to linear-spathulate. Heads 5–15, broadly campanulate, $\frac{3}{4}$ in. diam.; involucral bracts linear, obtuse, almost glabrous except a tuft of woolly hairs at the tip. Ray-florets 10–15, yellow; ligules $\frac{1}{4}$ in. long, spreading. Disc-florets numerous; limb 5-toothed. Achenes glabrous or pubescent. Pappus-hairs white, slender, scabrid.—*T. Kirk Students' Fl.* (1899) 348; *Cheesem. Man. N.Z. Fl.* (1906) 381. S. pachyphyllus *Cheesem. in Trans. N.Z. Inst.* xvi (1884) 410 (*not of Remy ex C. Gay*).

North Island: Mount Holdsworth, Tararua Range, *W. Townson!* South Island: Nelson—Mount Arthur and Mount Peel, *T. F. C.;* Mount Rintoul and Ben Nevis, *F. R. Gibbs! Bryant;* Mount Duppa, *J. H. Macmahon!* 3500–5500 ft. January–February.

Distinguished from *S. revolutus* by the much more coriaceous leaves, with the midrib prominent beneath, narrow laxly branched corymbs, and by the peduncles, pedicels, and involucral bracts being nearly glabrous.

30. **S. bifistulosus** *Hook. f. Fl. Nov. Zel.* i (1853) 144.—A small much-branched shrub 1–2 ft. high; branches decumbent at the base, erect above; bark pale, closely marked with the scars of the fallen leaves. Leaves crowded at the tips of the branches, spreading, 1 in. long, $\frac{1}{12}$ in. broad, narrow-linear, subacute, coriaceous, grooved above, beneath with the margins revolute to the midrib, a narrow woolly border showing on each side of the line of junction, the rounded edge of the leaf constricted here and there, and hence appearing crenate. Peduncles terminating the branchlets, 2–4 in. long, clothed with numerous leafy bracts. Heads solitary, $1\frac{1}{4}$ in. diam.; involucral bracts few, broad, herbaceous, woolly on the back. Achenes linear-oblong, glabrous, obscurely ribbed. Pappus white, soft.—*Handb. N.Z. Fl.* (1864) 161; *T. Kirk Students' Fl.* (1899) 344; *Cheesem. Man. N.Z. Fl.* (1906) 381.

South Island: Dusky Bay, *Lyall, Hector* and *Buchanan!* 1500–3000 ft.

Two specimens in Mr. Buchanan's herbarium, neither of them in very good condition, are all I have seen of this curious and most distinct species. More specimens are required before a satisfactory description can be drawn up.

31. **S. cassinioides** *Hook. f. Handb. N.Z. Fl.* (1864) 163.—An erect much-branched shrub 4–10 ft. high; bark deciduous, loose and papery; branches numerous, crowded, spreading, brittle, tomentose above. Leaves loosely imbricating, $\frac{1}{6}$–$\frac{1}{4}$ in. long, linear or linear-oblong, obtuse or subacute, sessile, coriaceous, entire, glabrous above, beneath clothed with appressed whitish-yellow tomentum. Heads solitary, sessile, terminating the branches,

S. cassinioides x haastii [see S. + T.] 71·98·
Governor's Bush. Mt Cook

$\frac{1}{3}$ in. diam.; involucral bracts 8–10, linear-oblong, obtuse, coriaceous, tomentose, the inner with broad scarious margins. Florets 12–20; ray-florets 4–6, with a broad and short revolute ligule; disc-florets broadly campanulate, deeply 5-lobed. Achenes linear, grooved, glabrous, expanded into a cup-shaped border at the tip. Pappus-hairs white, rigid, scabrid.—*T. Kirk Students' Fl.* (1899) 351; *Cheesem. Man. N.Z. Fl.* (1906) 382; *Ill. N.Z. Fl.* i (1914) t. 113.

South Island: Not uncommon in mountain districts from Nelson and Marlborough southwards to Foveaux Strait. 2000–4000 ft. January–February.

A well-marked species, easily recognized by its pale greenish-grey colour. Small specimens have a general resemblance to *Cassinia Vauvilliersii*; but the loose papery bark, more numerous branchlets, softer tomentum, and bright-yellow flowers distinguish it at a glance.

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32. **S. remotifolius** *Petrie in Trans. N.Z. Inst.* lv (1924) 96.—Apparently a sparingly branched shrub 4–6 ft. high, rarely more. Leaves broadly elliptic, 4–5 in. long exclusive of the petiole, $2\frac{1}{2}$–3 in. broad, subacute, firm but hardly coriaceous, margins obscurely sinuate in the upper $\frac{1}{2}$, midrib and veins conspicuous on both surfaces, dull-green above with scattered patches of white tomentum chiefly along the midrib and veins, below clothed with pale-yellow or greyish-yellow appressed tomentum; petioles about as long as the blades, grooved above, clothed with greyish tomentum. Inflorescence axillary towards the ends of the branches, paniculate, 5–6 in. long; rhachis zigzag, giving off below several alternate short more or less divaricating few-flowered branches subtended by small foliaceous bracts, upper portion linear, simple; the whole inflorescence densely clothed with greyish-white tomentum. Heads on short pedicels, discoid, $\frac{1}{3}$ in. diam.; involucral bracts about 8, linear, tomentose. Florets about 12; limb of corolla narrow funnel-shaped, rather deeply 5-toothed, segments revolute. Achenes linear, shortly pilose.

North Island: Open rocky places near the mouth of the Mokau River, not common, *W. A. Thomson!*

The above description is mainly Mr. Petrie's, which he has kindly allowed me to use. The only specimen I have seen is one from a plant cultivated by the discoverer, Mr. W. A. Thomson, in his garden at Half-way Bush, Dunedin. The species is allied to *S. elaeagnifolius*, but differs in habit, in the broader thinner leaves on long slender petioles, and in the lateral lax inflorescence.

33. **S. elaeagnifolius** *Hook. f. Fl. Nov. Zel.* i (1853) 150, t. 41.—A stout or slender spreading shrub 4–10 ft. high; branches grooved, and with the petioles, under-surface of the leaves, and inflorescence densely clothed with pale-buff tomentum. Leaves on grooved petioles $\frac{1}{2}$–$1\frac{1}{2}$ in. long; blade 2–5 in., obovate or ovate-oblong or elliptic-oblong to oblong-lanceolate, obtuse or subacute, coriaceous, glabrous and shining above, midrib and principal veins usually evident. Panicles terminal, stout, branched; pedicels densely tomentose. Heads $\frac{1}{3}$ in. diam., campanulate or obconic, discoid; involucral bracts 9–12, linear-oblong, obtuse, coriaceous, very densely woolly. Female florets often wanting; when present 1–3, small, tubular with the mouth minutely toothed. Disc-florets numerous, with a narrow-campanulate 5-toothed limb. Achenes-linear, grooved, hispid. Pappus-hairs dirty-white, rigid, scabrid.—*Handb. N.Z. Fl.* (1864) 162 *T. Kirk Students' Fl.* (1899) 349; *Cheesem. Man. N.Z. Fl.* (1906) 382.

Var. **Buchanani** *T. Kirk l.c.*—Smaller, densely branched, 3–4 ft. high. Leaves broadly oblong, 1–2 in. long. Panicle reduced to a short raceme.—S. Buchanani *J. B. Armstr. in Trans. N.Z. Inst.* xiii (1881) 339.

North and South Islands, Stewart Island: Not uncommon in mountainous localities from the East Cape, Taupo, and Mount Egmont southwards. Ascends to 4500 ft. December–February.

A very widely distributed plant in the mountain districts of both Islands, often forming a large proportion of the vegetation.

S. puffini Allan J. Ann. Arbor. 27 (1926) 174

T. 76: 596

34. **S. rotundifolius** *Hook. f. Fl. Nov. Zel.* i (1853) 149.—A stout branching shrub or small tree 6–30 ft. high; bark thin, smooth; branches grooved, and with the petioles, leaves beneath, and inflorescence densely clothed with pale-buff tomentum. Leaves on stout grooved petioles 1–3 in. long; blade 2–5 in. diam., orbicular or broadly oblong, unequal or rounded or slightly cordate at the base, very thick and coriaceous, glabrous and shining above, quite entire. Panicle terminal, corymbosely branched; pedicels stout. Heads numerous, $\frac{1}{3}$ in. diam., campanulate, discoid; involucral bracts 9–12, linear-oblong, very coriaceous, densely woolly. Female florets 1–4, small, narrow-tubular with a minutely toothed mouth. Disc-florets numerous, with a campanulate 5-toothed limb. Achenes grooved, hispid. Pappus-hairs rigid, scabrid.—*Handb. N.Z. Fl.* (1864) 162; *T. Kirk Forest Fl.* (1889) t. 116; *Students' Fl.* (1899) 349; *Cheesem. Man. N.Z. Fl.* (1906) 383; *Cockayne Veg. N.Z.* (1921) tt. 1, 10. Brachyglottis rotundifolia *Forst. Char. Gen.* (1776) 92; *A. Cunn. Precur.* (1838) n. 464. Cineraria rotundifolia *Forst. f. Prodr.* (1786) 56; *A. Rich. Fl. Nouv. Zel.* (1832) 254. See Trans. 57:1926:59; 50:183

Var. **ambiguus** *Cheesem. n. var.*—Leaves never orbicular, usually broadly oblong or obovate. Otherwise much resembling the type. See T. 72:40

South Island: Westland and Otago—Coastal localities from Jackson's Bay to Milford Sound, Port Preservation, and Foveaux Strait. Stewart Island and Adjacent Islands: Everywhere abundant in coastal scrub. The Solanders: *Captain Bollons!* Var. *ambiguus*: North-west Nelson—West Wanganui, *H. J. Matthews! B. C. Aston.* Cape Foulwind, near Westport, *W. Townson! Petrie!* Sea-level to 3500 ft. December–January.

Typical *S. rotundifolius* is a very handsome and well-marked plant, exceedingly common in the coastal districts of Stewart Island and its adjacent islets. Var. *ambiguus* recedes from the type in the direction of *S. elaeagnifolius*, but in my opinion is best placed under *S. rotundifolius*. That was Kirk's disposition of it, as given in the "Students' Flora," and few were better acquainted with *S. rotundifolius* than he was. Mr. H. J. Matthews, who had a wide experience with *S. rotundifolius* both as a cultivated plant and in the wild state, informed me that he was fully satisfied that the proper position of the variety was with this species. On the other hand, Petrie (Trans. N.Z. Inst. xlvi (1914) 30) "refers without hesitation" the Cape Foulwind plant to *S. elaeagnifolius*. Cockayne (Trans. N.Z. Inst. xlvi (1914) 30) considers that the West Wanganui form is neither typical *S. rotundifolius* nor *S. elaeagnifolius*, but may be a variety of either.

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35. **S. Bidwillii** *Hook. f. Fl. Nov. Zel.* i (1853) 150.—A small stout much or sparingly branched shrub 1–5 ft. high; branches, petioles, leaves beneath, and inflorescence densely clothed with appressed whitish or pale-buff tomentum. Leaves $\frac{1}{2}$–2 in. long, broadly oblong or obovate-oblong, obtuse, rounded or narrowed at the base, excessively thick and coriaceous, glabrous and shining above, with reticulated venation; margins often tomentose; petioles $\frac{1}{6}$–$\frac{3}{4}$ in., stout, articulated to the branch. Corymbs terminal, stout, branched, 1–3 in. long. Heads few or many, $\frac{1}{4}$–$\frac{1}{3}$ in. diam., campanulate, discoid; involucral bracts 8–12, linear, very thick and coriaceous, densely woolly. Female florets 3–5, tubular, mouth minutely

S. Bidwillii x elaeagnifolius Trans 59:730 Allan's Hss

34. S. puffini HHA. Journ. Ann. Arb. 27:1926:174

S. cockaynei S.+T. Trans. 12:38 Westhaven
S. bennettii " " " 39 Mt Cargill etc

toothed. Disc-florets numerous, with a 5-toothed campanulate limb. Achenes linear, grooved, glabrous. Pappus-hairs white, rigid, scabrid.—*Handb. N.Z. Fl.* (1864) 162; *T. Kirk Students' Fl.* (1899) 350 (*in part*); *Cheesem. Man. N.Z. Fl.* (1906) 383; *Ill. N.Z. Fl.* i (1914) t. 114.

Var. **viridis** *Cheesem. l.c.*—Rather taller and not so stout. Leaves 1½–3 in. long, oblong-obovate, narrowed to the base, not so coriaceous; petioles ½–1 in. long. Corymbs larger, 3–6 in. long. Heads much as in the type.—S. viridis *T. Kirk l.c.*

North Island: Not uncommon on the mountains from the East Cape and Taupo southwards. South Island: Var. *viridis*: Mountains of Nelson, Marlborough, and Canterbury, from Mount Arthur to the Rakaia Valley. 2500–5000 ft. December–January.

T. 71: 98.

Mr. Kirk has described the South Island plant as a distinct species under the name of *S. viridis*. It is somewhat larger in all its parts, but differs in no essential character, and is far better regarded as a variety only. Specimens of *S. Bidwillii* collected at the foot of Ruapehu by the Rev. F. H. Spencer almost match others gathered in the South Island by myself.

25. **TRAVERSIA** Hook. f. 1864

A small erect branching shrub; branchlets more or less glutinous. Leaves alternate, sessile, serrate; venation reticulate. Heads corymbose, homogamous, broadly campanulate, 10–12-flowered, bracteolate. Involucre of 6–8 broad-oblong, obtuse, erect or spreading, rigid and coriaceous scales, campanulate above. Receptacle alveolate. Anthers obtuse, without tails. Style-branches truncate, papillose. Pappus of 2 series of very rigid unequal scabrid dirty-white hairs. Achenes short, glabrous.

A genus consisting of a single isolated species, with no near allies. It differs from *Senecio*, as Sir J. D. Hooker has observed, in the rigid pappus and coriaceous involucral scales. The leaves are of a very similar type to those of the American genus *Baccharis*; and their venation, according to Hooker, "recalls that of the Juan Fernandez genera *Balbisia* and *Robinsonia*." It appears to me somewhat inexplicable that a plant possessing the well-marked differences mentioned above should have been reduced to *Senecio* by Hooker and Bentham in the "Genera Plantarum." I feel sure that botanists generally will, when a more detailed examination of the evidence has been made, coincide with me in re-establishing *Traversia* as an independent genus.

1. **T. baccharoides** *Hook. f. Handb. N.Z. Fl.* (1864) 164.—A small spreading shrub 1–4 ft. high; perfectly glabrous in all its parts, but the young branchlets, leaves, and involucres glutinous; branches slender, angled, grooved. Leaves 1½–3 in. long, ½–1 in. broad, obovate-lanceolate or obovate-spathulate, acute or subacute, gradually narrowed to a sessile and decurrent base, serrate, subcoriaceous; veins thin, subflabellate. Corymbs terminal, lax, leafy at the base; peduncles slender, usually forked, with sparse linear bracts above. Heads few, ⅓–½ in. diam., discoid and homogamous; involucral bracts about 8, in 1 series, shorter than the florets, linear-oblong, obtuse, coriaceous, with broad membranous ciliolate margins. Receptacle flat, alveolate. Florets 12–15, all tubular and hermaphrodite; limb campanulate, deeply 5-lobed. Stamens exserted; anthers not tailed. Achenes linear-oblong or linear-obovoid, narrowed at both ends, grooved, glabrous. Pappus-hairs in 1 series, rigid, scabrid.—Senecio geminatus *T. Kirk Students' Fl.* (1899) 350; *Cheesem. Man. N.Z. Fl.* (1906) 384; *Ill. N.Z. Fl.* i (1914) t. 115.

South Island: Mountains of Nelson, Marlborough, and Canterbury; not uncommon from Mount Arthur to the Upper Waimakariri. 1500–4500 ft. January–February.

26. **MICROSERIS** Don.

Annual or perennial glabrous herbs. Leaves chiefly radical, entire or toothed or pinnatifid. Scapes long, leafless, single-headed. Heads homogamous. Involucre oblong or cylindric; bracts in about 2 series, with a few short imbricate ones below. Receptacle flat, without scales. Florets all ligulate, yellow. Achenes narrow, attenuate at the base, cylindrical, ribbed. Pappus of few or several linear flat scales tapering into simple or plumose bristles.

A genus of 30 to 40 species, all western North American except one from Chile and another from Australia and New Zealand.

1. **M. scapigera**, *O. Hoffm. Pflanzen.* iv, abt. 5 (1894) 358.—A perfectly glabrous perennial herb; roots thick and fleshy, almost tuberous, juice milky. Leaves all radical, very variable in size, 2–10 in. long, narrow-linear to lanceolate, flaccid, entire or irregularly toothed or pinnatifid; the lobes narrow, distant, spreading. Scapes usually exceeding the leaves, rarely shorter, sometimes puberulous above. Heads solitary, $\frac{1}{2}$–$\frac{2}{3}$ in. long; involucral bracts linear, acute, rather fleshy, with membranous borders. Florets longer than the involucre. Achenes linear, deeply grooved. Pappus-bristles slightly dilated below, serrulate or shortly plumose.—Scorzonera scapigera *Forst. f. Prodr.* (1786) 91; *A. Cunn. Precur.* (1838) n. 430. M. Forsteri *Hook. f. Fl. Nov. Zel.* i (1853) 151; *Fl. Tasm.* i (1860) 226, t. 66; *Handb. N.Z. Fl.* (1864) 164; *T. Kirk Students' Fl.* (1899) 356; *Cheesem. Man. N.Z. Fl.* (1906) 384.

North and South Islands: From the Middle Waikato and Rotorua southwards, plentiful. Stewart Island: *Cockayne.* Sea-level to 4000 ft. December–February.

27. **PICRIS** Linn.

Erect branched hispid herbs with milky juice. Leaves alternate or radical, entire or toothed or pinnatifid. Heads corymbose, yellow, homogamous. Involucre urceolate or campanulate, inner bracts in 1 series, subequal; outer in several series, narrow, herbaceous; or the outermost broad and foliaceous. Receptacle flat, naked. Florets all ligulate. Anthers sagittate at the base, acute or setaceous. Achenes linear or oblong, more or less incurved, subterete or angled, 5–10-ribbed with the ribs transversely rugose, narrowed above or distinctly beaked. Pappus copious, of 2 series of soft hairs; inner broad at the base, plumose; outer fewer, slender.

Species about 35, mainly natives of Europe and temperate Asia, the New Zealand species widely spread in most temperate and subtropical countries.

1. **P. hieracioides** *Linn. Sp. Plant.* (1753) 792.—A biennial herb 1–3 ft. high, more or less hispid with simple or barbed hairs; stem corymbosely branched above. Leaves 3–6 in. long, linear-oblong, lanceolate or linear, sinuate-toothed, the lower ones tapering into a petiole, the upper smaller and narrower, sessile, stem-clasping. Peduncles long, slender. Heads $\frac{3}{4}$–1 in. diam.; involucral bracts hispid and pubescent. Achenes red-brown, narrow-ellipsoid, tapering into a short beak, very strongly transversely ribbed. Pappus-hairs deciduous, soft, white, plumose.—*A. Cunn. Precur.* (1838) n. 432; *Raoul Choix* (1846) 45; *Hook. f. Fl. Nov. Zel.* i (1853) 151;

Handb. N.Z. Fl. (1864) 165; *Benth. Fl. Austral.* iii (1866) 678; *T. Kirk Students' Fl.* (1899) 357; *Cheesem. Man. N.Z. Fl.* (1906) 385. P. attenuata *A. Cunn. Precur.* (1838) n. 433.

North Island: Formerly not uncommon in open places from the North Cape to the Upper Thames and Waikato, but now much scarcer. South Island: Nelson—Foxhill, *T. F. C.* Canterbury—Broken River basin, *T. F. C.* Sea-level to 2500 ft. August–December.

28. **CREPIS** Linn.

Annual or perennial branched or rarely scapigerous herbs, juice milky. Leaves radical or alternate, entire or toothed or pinnatifid. Heads peduncled, solitary or panicled or corymbose, yellow or red, homogamous. Involucre campanulate or cylindric; bracts many, linear, equal, with a few smaller ones at their base. Receptacle flat or slightly concave, naked or fimbrillate. Florets all ligulate. Achenes linear-oblong, 10–20-ribbed, narrowed or beaked at the tip. Pappus short or long, usually copious; hairs soft, white, simple.

A large genus, containing about 130 species, most abundant in the temperate regions of the Northern Hemisphere, but extending also into subtropical districts. The single New Zealand species is a somewhat anomalous member of the genus; it was referred to *Hieracium* by Banks and Solander, to *Crepis* by Hooker, and to *Sonchus* in the "Genera Plantarum."

1. **C. novae-zealandiae** *Hook. f. Handb. N.Z. Fl.* (1864) 164.—A small scapigerous herb 2–8 in. high, either glabrous or the involucres and scapes, rarely the leaves, white and tomentose; root stout, fleshy. Leaves all radical, spreading, crowded, glaucous, 2–6 in. long, narrow linear-oblong or linear-obovate, deeply and unequally lobed or pinnatifid, the terminal segment large, rounded, lateral much smaller, entire or toothed. Scape slender, longer than the leaves, glabrous or tomentose, often studded with black glandular hairs. Head solitary, ½–1 in. diam.; involucral bracts broadest at the base, gradually narrowed into obtuse black tips, glabrous or cottony and sparsely covered with black glandular hairs. Achene linear-oblong, glabrous, compressed, ribbed. Pappus-hairs copious, very soft, white.—*Lindsay Contrib. N.Z. Bot.* (1868) 54, t. 3; *T. Kirk Students' Fl.* (1899) 359; *Cheesem. Man. N.Z. Fl.* (1906) 386.

South Island: Not uncommon in mountain districts on the east side of the Island, from Marlborough to Foveaux Strait. Sea-level to 3000 ft. January–February.

29. **TARAXACUM** Linn.

Small scapigerous perennial herbs with milky juice. Root perpendicular, neck ringed with the remains of the old leaves, glabrous or more or less clothed with long woolly hairs. Leaves all radical, rosulate, herbaceous or succulent or almost coriaceous, narrowed at the base, entire or sinuate or runcinate-pinnatifid. Scapes 1 or more from the head of the root, leafless or in some species bearing small scales. Heads solitary, always erect, many-flowered, homogamous. Involucre campanulate or oblong; bracts herbaceous; inner in 1 series, equal, erect; outer in several series, smaller, often recurved. Receptacle flat, naked. Florets all ligulate.

Anthers sagittate at the base, not tailed. Achenes cylindric or fusiform, longitudinally grooved, muricate, narrowed at the base, above drawn out into a long and slender beak. Pappus-hairs copious, simple, white.

A genus of from 40 to 50 species, mainly found in Europe and Asia; much rarer in North America, Africa, and Australia. The single New Zealand species is also found in temperate South America.

1. **T. magellanicum** *Comm. in Schultz Bipont. in Flora* xxxviii (1855) 122.—Very variable in size, 1½–8 in. high. Root rather stout, simple or few-headed, neck scarcely scaly, glabrous or sparingly woolly. Leaves all radical, rosulate, glabrous or slightly puberulous beneath, thin and membranous, 2–4 in. long, ¼–¾ in. broad, lanceolate or linear-oblong in outline, narrowed towards the base, sparingly toothed but usually runcinate-pinnatifid, the broad triangular lobes pointing downwards, the terminal lobe much the largest. Scapes single or many, erect or inclined, at the time of flowering about equalling the leaves, younger ones pubescent, older glabrescent. Heads ⅓–¾ in. diam. Involucral scales in 2 series, often tinged with red, and the margins more or less membranous; inner series in a single row, narrow-linear, strict, erect; outer series in several rows, broader, ovate or nearly so, acute, erect and appressed. Florets numerous. Achenes linear-oblong, grooved, muricate.—*Handel-Mazetti Monog. Tarax.* (1907) 56. T. officinale *var.* palustris *T. Kirk Students' Fl.* (1899) 361. T. Dens-leonis *Hook. f. Fl. Nov. Zel.* i (1853) 152; *Handb. N.Z. Fl.* (1864) 165 (*in part, but not of Lam.*). T. officinale *Cheesem. Man. N.Z. Fl.* (1906) 387 (*in part, but not of Wigg.*).

North and South Islands, Stewart Island, Chatham Islands: From Mercury Bay and the East Cape southwards, not uncommon in mountain districts, rarer in the lowlands, ascends to 4000 ft. *Dandelion.* November–February.

Also a native of South America, stretching from the Andes of Chile to Patagonia, Fuegia, and the Falkland Islands. It has also been reported from Australia. In New Zealand it is usually confused with the common English Dandelion (*Taraxacum vulgare*), which, although originally a native of Europe and western Asia, has of late years followed the footsteps of Man all round the world. But *T. vulgare* (which is now abundant in cultivated fields throughout the Dominion) can always be distinguished from the New Zealand plant by its much larger size and more succulent habit, and particularly by the exterior bracts of the involucre being linear, not margined, and more or less reflexed. In *T. magellanicum* the exterior bracts are conspicuously margined, and always erect and appressed.

30. **SONCHUS** Tourn.

Erect leafy annual or perennial succulent herbs, juice milky. Leaves alternate or radical, entire or toothed or pinnatifid; cauline often amplexicaul. Heads peduncled, in terminal irregularly branched corymbs or panicles, homogamous. Involucre ovoid, usually becoming conical after flowering; bracts imbricated in several series, the outer smaller. Receptacle flat, naked. Florets all ligulate. Anthers shortly tailed at the base. Achenes ovoid or ellipsoid, more or less compressed, ribbed and often transversely rugose, not beaked. Pappus-hairs copious, in many series, soft, white, simple.

Species from 40 to 45, mostly natives of the temperate regions of the Northern Hemisphere; a few spread over the whole world, but probably naturalized in many districts. One of the New Zealand species is endemic, the two others are cosmopolitan.

see Black Fl. S. Aust. p. 661
Stewart Vict. 1195

* Annual.

Upper leaves amplexicaul, with rounded auricles. Achenes longitudinally ribbed, not transversely wrinkled	1. *S. asper.*
Upper leaves amplexicaul, with acute auricles. Achenes longitudinally ribbed and transversely wrinkled	2. *S. oleraceus.*

** Perennial.

Leaves large, 1–2½ ft. long. Heads 1–1½ in. diam., purplish; pedicels cottony	3. *S. grandifolius.*

T. 57: 67. a 45: 277.

Exotic 1. **S. asper** *Hill Herb. Brit.* i, 47.—A tall succulent annual herb

Sonchus asper, Hill.

not native to N.Z. see T.N.Z.I.

vol. 57, p. 67. (Ckn. & Allan).

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Var. **littoralis** *T. Kirk in Trans. N.Z. Inst.* xxvi (1894) 265.—Often biennial or perennial. Stems rather stout, 1–2 ft. high, sparingly branched; root thick and fleshy. Leaves mostly radical, spreading, 3–7 in. long, linear-oblong or linear-obovate, obtuse or acute, finely or coarsely toothed, rather thick, almost fleshy; cauline leaves few, acute, amplexicaul. Outer involucral bracts obtuse, inner acute. Achenes longitudinally ribbed, glabrous.—*Students' Fl.* (1899) 362; *Cheesem. Man. N.Z. Fl.* (1906) 388.

North and South Islands, Stewart Island, Chatham Islands: Abundant throughout, from the North Cape southwards; the variety *littoralis* confined to maritime cliffs. *Sow-thistle; Rauroroa; Tawheke; Puwha.* Flowers from spring to autumn.

As this was collected by Banks and Solander it must be regarded as indigenous. The variety *littoralis* is a very curious form, and may be entitled to rank as a species, as has been suggested by Dr. Cockayne.

Exotic 2. **S. oleraceus** *Linn. Sp. Plant.* (1753) 794.—A tall erect annual herb 2–3 ft. high, glabrous or sparsely glandular above. Leaves lanceolate,

Sonchus oleraceus, Linn.

not native to N.Z. see T.N.Z.I.

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Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Abundant throughout. *Sow-thistle; Pororua; Rauriki.* Flowers from spring to autumn. Perhaps not truly native.

3. **S. grandifolius** *T. Kirk in Trans. N.Z. Inst.* xxvi (1894) 266.—Rootstock stout, fleshy, creeping, sometimes 2½ in. diam. Stem tall, robust, succulent, corymbosely branched above, 2–5 ft. high. Radical leaves 1–2½ ft. long, 4–8 in. broad; petioles 6–9 in., stout, dilated at the base but not amplexicaul; blade oblong or ovate-oblong, irregularly pinnatifid or pinnate; segments 4–6 pairs, broad, overlapping, coarsely doubly serrate or dentate, almost spinous-toothed, subcoriaceous, scabrid above, veins

Anthers sagittate at the base, not tailed. Achenes cylindric or fusiform, longitudinally grooved, muricate, narrowed at the base, above drawn out into a long and slender beak. Pappus-hairs copious, simple, white.

A genus of from 40 to 50 species, mainly found in Europe and Asia; much rarer in North America, Africa, and Australia. The single New Zealand species is also found in temperate South America.

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Species from 40 to 45, mostly natives of the temperate regions of the Northern Hemisphere; a few spread over the whole world, but probably naturalized in many districts. One of the New Zealand species is endemic, the two others are cosmopolitan.

See Black Fl. S. Aust. p. 661
Swart Vict 1195

* Annual.

Upper leaves amplexicaul, with rounded auricles. Achenes longitudinally ribbed, not transversely wrinkled .. .. .. 1. *S. asper.*
Upper leaves amplexicaul, with acute auricles. Achenes longitudinally ribbed and transversely wrinkled .. .. .. 2. *S. oleraceus.*

** Perennial.

Leaves large, 1–2½ ft. long. Heads 1–1½ in. diam., purplish; pedicels cottony .. .. 3. *S. grandifolius.*

T. 57: 67. a 45: 277.

Exotic. 1. **S. asper** *Hill Herb. Brit.* i, 47.—A tall succulent annual herb 2–3 ft. high, with a hollow grooved stem, glabrous or sparsely glandular above. Leaves lanceolate, entire or toothed or pinnatifid; margins waved or crisped, spinous-toothed; lower ones petiolate, upper semi-amplexicaul with rounded auricles. Heads ¾–1 in. diam., crowded in a short corymbose panicle, sometimes almost umbellate. Involucre glabrous, bracts acute. Achenes oblong, compressed, longitudinally ribbed but not marked with tranverse wrinkles or asperities.—*T. Kirk Students' Fl.* (1899) 362; *Cheesem. Man. N.Z. Fl.* (1906) 387. S. oleraceus *var. β Hook. f. Fl. Nov. Zel.* i (1853) 153; *Handb. N.Z. Fl.* (1864) 166.

(Kirk) chem. Rep. Bot. Surv. Kaikoura 1a. 1907: 21.

Var. **littoralis** *T. Kirk in Trans. N.Z. Inst.* xxvi (1894) 265.—Often biennial or perennial. Stems rather stout, 1–2 ft. high, sparingly branched; root thick and fleshy. Leaves mostly radical, spreading, 3–7 in. long, linear-oblong or linear-obovate, obtuse or acute, finely or coarsely toothed, rather thick, almost fleshy; cauline leaves few, acute, amplexicaul. Outer involucral bracts obtuse, inner acute. Achenes longitudinally ribbed, glabrous.—*Students' Fl.* (1899) 362; *Cheesem. Man. N.Z. Fl.* (1906) 388.

North and South Islands, Stewart Island, Chatham Islands: Abundant throughout, from the North Cape southwards; the variety *littoralis* confined to maritime cliffs. *Sow-thistle; Rauroroa; Tawheke; Puwha.* Flowers from spring to autumn.

As this was collected by Banks and Solander it must be regarded as indigenous. The variety *littoralis* is a very curious form, and may be entitled to rank as a species, as has been suggested by Dr. Cockayne.

Exotic. 2. **S. oleraceus** *Linn. Sp. Plant.* (1753) 794.—A tall erect annual herb 2–3 ft. high, glabrous or sparsely glandular above. Leaves lanceolate, entire or toothed or pinnatifid; margins flat or nearly so, not crisped; lower ones petiolate, upper semi-amplexicaul with sagittate acute auricles. Heads ¾–1 in. diam., crowded in a short corymbose panicle, often subumbellate. Involucres glabrous or slightly cottony at the base, sometimes with a few glandular hairs. Achenes linear-oblong, compressed, longitudinally grooved and conspicuously transversely wrinkled.—S. oleraceus *var. α Hook. f. Fl. Nov. Zel.* i (1853) 153; *Handb. N.Z. Fl.* (1864) 166; *T. Kirk Students' Fl.* (1899) 362; *Cheesem. Man. N.Z. Fl.* (1906) 388.

Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Abundant throughout. *Sow-thistle; Pororua; Rauriki.* Flowers from spring to autumn. Perhaps not truly native.

3. **S. grandifolius** *T. Kirk in Trans. N.Z. Inst.* xxvi (1894) 266.—Rootstock stout, fleshy, creeping, sometimes 2½ in. diam. Stem tall, robust, succulent, corymbosely branched above, 2–5 ft. high. Radical leaves 1–2½ ft. long, 4–8 in. broad; petioles 6–9 in., stout, dilated at the base but not amplexicaul; blade oblong or ovate-oblong, irregularly pinnatifid or pinnate; segments 4–6 pairs, broad, overlapping, coarsely doubly serrate or dentate, almost spinous-toothed, subcoriaceous, scabrid above, veins

finely reticulate. Upper cauline leaves sessile by a broad base. Heads large, 1–1½ in. diam.; pedicels clothed with white cottony wool. Involucral bracts in 3–4 series, broadest at the base, gradually tapering into blunt points, the outer with a row of short spines down the median line. Florets numerous purplish. Achenes large, broad, spongy, with 3–6 longitudinal ribs; margins broad.—*Students' Fl.* (1899) 362; *Cheesem. Man. N.Z. Fl.* (1906) 388; *Ill. N.Z. Fl.* 3 (1914) t. 116.

Chatham Islands: Not common on sand-dunes, *H. H. Travers, J. D. Enys! F. A. D. Cox* and *Cockayne!* January–February.

A very handsome and distinct species, endemic in the Chatham Islands. It does not appear to have any close ally.

APPENDIX.

1. SYNOPTICAL KEY TO THE FAMILIES.

In the first edition of this work, published in 1906, I adopted the classification followed by Hooker and Bentham in their well-known "Genera Plantarum," published between the years 1862 and 1883. It was the arrangement followed by Hooker in his "Flora Novae-Zelandiae" and in the later "Handbook of the New Zealand Flora." It was also used by Bentham in his "Flora Australiensis," and in the whole of the series of colonial floras prepared under the more or less active guidance of the authorities at Kew. Its principal defect is the unnatural position given to the Gymnosperms, and in the sequence of the families of the Dicotyledons, which is made to depend entirely on the characters afforded by the perianth; the polypetalous orders being followed by the gamopetalous, and these in their turn by the various families in which the floral envelopes are less developed or altogether wanting. But this last group, known as the *Monochlamydeae* or *Incompletae*, consists largely of families presenting well-marked affinities with others in the Polypetalous or Gamopetalous divisions. Hence by recent authors, and notably by Engler in "Die Naturlichen Pflanzenfamilien," the Monochlamydeous division has been entirely abandoned, the families composing it being relegated in part to the *Polypetaleae* and in part to the *Gamopetalae*.

Of late years Engler's views have received wide acceptance, and have been followed in most recent floras. I am therefore adopting it in this edition. The subjoined clavis gives the characters of the families and their position in the classification.

Subkingdom I. **CRYPTOGAMIA.**

Plants not bearing true flowers—that is, having no stamens nor ovules, and never producing seeds containing an embryo.

Class I. PTERIDOPHYTA.

Plants usually furnished with roots, leaves, and stems; in all cases containing well-developed vascular tissue. Reproductive organs originating from sporangia or spore-cases, containing microscopic spores, which on germination develop a flat or irregular prothallium, which bears the antheridia and archegonia.

1. **Filices.** Sporangia minute, placed on the margin or under-surface of the leaf or frond, rarely somewhat larger and arranged in spikes or panicles. Spores all of one kind.—Fronds circinate in vernation (except in the suborder *Ophioglossaceae*). (p. 1.)

2. **Marsileaceae.** Sporangia of 2 kinds, macrosporangia and microsporangia, enclosed together in the cavities or cells of globose sporocarps near the base of the fronds. Macrosporangia containing a single macrospore; microsporangia with numerous microspores.—Marsh-plants, usually of small size; fronds circinate in vernation. (p. 95.)

3. **Salviniaceae.** Sporangia of 2 kinds, macrosporangia and microsporangia, enclosed in distinct sporocarps on the under-surface of the frond. Macrosporangia containing a single macrospore; microsporangia with numerous microspores.—Free-floating fugacious annual water-plants, of small size. (p. 96.)

4. **Lycopodiaceae.** Sporangia all of one kind, placed singly at the upper base of the leaves or of the bracts of a spike or cone.—Stems simple or branched, erect or pendulous, or prostrate and creeping, usually leafy throughout; leaves small. (p. 96.)

5. **Isoetaceae.** Sporangia large, placed in a hollow of the dilated base of the leaf, those of the outer leaves containing macrospores, those of the inner leaves microspores.—Aquatic or amphibious stemless plants, often entirely submerged; leaves densely tufted, linear or filiform. (p. 106.)

The remaining classes and orders of *Cryptogamia* are not included in the present work.

Subkingdom II. SPERMATOPHYTA.

Plants producing seeds which contain an embryo formed of one or more rudimentary leaves. Microspores (pollen-grains) contained in microsporangia (anther-cells). Macrosporangia (ovules) borne on a flat or enrolled modified leaf (carpel), each containing a single macrospore (embryo-sac). This is fertilized by means of a tube (pollen-tube) proceeding from a pollen-grain.

Class I. GYMNOSPERMAE.

Ovules naked, not enclosed in an ovary; style and stigma wanting.

6. **Pinaceae.** Resinous trees or shrubs, usually but not invariably monoecious. Fruit a perfect cone with more or less woody scales. Seeds without an aril. (p. 107.)

7. **Taxaceae.** Resinous trees or shrubs, usually but not invariably dioecious. Fruit rarely a cone, often drupaceous. Seeds frequently with an aril. (p. 110.)

Class II. ANGIOSPERMAE.

Ovules enclosed in a closed cavity (ovary). Stigmas one or more.

Subclass I. MONOCOTYLEDONS.

Stem consisting of a cellular axis traversed longitudinally by scattered closed vascular bundles, with no defined central pith or separable bark. Leaves usually with parallel veins. Parts of the flower generally in threes or fours, never in fives. Embryo with a single terminal cotyledon.

Order I. Pandanales.

Aquatic or marsh plants or trees with linear leaves. Flowers naked, in compound heads or spikes.

8. **Typhaceae.** Tall herbs with linear leaves and cylindrical spikes of naked flowers. Perianth wanting, or reduced to linear scales or bristles. (p. 121.)

9. **Pandanaceae.** Trees or climbing shrubs: leaves narrow, spinulose-serrate. Flowers dioecious, on oblong or globose spadices. Perianth wanting. Stamens numerous. Ovaries crowded, often connate, 1-celled. Ovules numerous in the New Zealand genus. (p. 122.)

10. **Sparganiaceae.** Herbs with creeping rhizomes bearing linear leaves sheathing at the base. Flowers monoecious, crowded in globose heads, the male heads uppermost. Perianth reduced to a few chaffy scales. (p. 123.)

Order II. **Naiadales.**

Aquatic or marsh plants, leaves various. Flowers hermaphrodite or unisexual. Perianth present or rudimentary. Carpels 1 or more, usually distinct and separate.

11. **Naiadaceae.** Submerged or floating plants or marsh-herbs. Perianth wanting or of 3–6 herbaceous segments. Stamens 1–6. Ovary of 1–6 free or connate carpels, each 1-celled and with a solitary ovule. (p. 124.)

Order III. **Glumiflorae.**

Herbs, rarely woody. Stems (culms) usually simple. Leaves long and narrow, entire or minutely serrulate. Flowers without a perianth, usually hermaphrodite, in the axils of chaffy scales (glumes), arranged in spikes or spikelets.

12. **Gramineae.** Stem cylindrical, hollow except at the nodes; leaf-sheaths split to the base. Flowers hermaphrodite or rarely unisexual. Perianth wanting or represented by 2 minute scales. Anthers versatile. (p. 132.)

13. **Cyperaceae.** Stem usually solid and trigonous; leaf-sheaths entire. Flowers hermaphrodite or unisexual. Perianth wanting or represented by minute hypogynous scales or bristles. Anthers basifixed. Ovary 1-celled. Fruit compressed or trigonous. (p. 212.)

Order IV. **Principes.**

Trees or woody plants, rarely climbing; leaves large, flabellately or pinnately divided. Perianth green, herbaceous or fleshy, of 6 segments or leaflets. Stamens usually 6. Ovary 1–3-celled; ovules solitary in each cell. Fruit drupaceous.

14. **Palmae.** Includes the whole order. (p. 281.)

Order V. **Spathiflorae.**

Herbs, very variable in size and habit, but in the greater part of the order the inflorescence is composed of a fleshy spadix bearing the staminate flowers towards the top and the pistillate below, the whole usually enclosed in a spathe. But in the one family represented in New Zealand the plant is greatly reduced in size, and the flowers are of very simple structure.

15. **Lemnaceae.** Minute water-plants, consisting of green floating fronds. Flowers minute, without perianth, placed in clefts on the margins of the fronds, usually a single female with one or two males by its side. Male flowers of a single stamen; female of a solitary carpel. (p. 282.)

Order VI. **Farinosae.**

Herbs, usually with narrow leaves, sometimes rush-like. Flowers unisexual or hermaphrodite. Perianth generally present; leaflets 3 or 6. Ovary 1–3-celled, or of 1–3 separate carpels.

16. **Restiaceae.** Sedge-like or rush-like perennial herbs. Stems solid, terete; leaf-sheaths split to the base. Flowers unisexual. Perianth of 6 scarious leaflets. Stamens 3. Ovary 1–3-celled; ovules solitary in each cell, pendulous. Fruit nucular or capsular. (p. 283.)

17. **Centrolepidaceae.** Small annual or perennial herbs, sometimes almost moss-like; leaves linear or filiform. Flowers hermaphrodite or polygamous. Perianth wanting. Stamens 1 or 2; anthers versatile. Ovary either 1-celled or collaterally 2–3-celled, or of several distinct 1-celled carpels. (p. 286.)

Order VII. **Liliiflorae.**

Herbs, more rarely climbing shrubs or trees, rhizomatous or bulbous, or roots fibrous. Leaves narrow, rush-like or grass-like to equitant or ensiform. Perianth more or less conspicuous, petaloid; segments usually 6, in 2 series. Stamens 3 or 6. Ovary superior or inferior, 1–3-celled. Fruit capsular or baccate. Albumen of the seed fleshy or horny.

18. **Juncaceae.** Perennial herbs, with narrow often rush-like leaves. Perianth green or brown, scarious, of 6 segments or leaflets. Stamens 3 or 6. Ovary superior, 1–3-celled; ovules 1–many in each cell. Fruit a 3-valved capsule. (p. 290.)

19. **Liliaceae.** Perennial herbs, climbing shrubs, or trees; leaves various. Perianth petaloid, of 6 segments or leaflets. Stamens 6, rarely 3. Ovary superior, 3-celled, ovules 2 or more in each cell. Fruit a 3-celled capsule or berry; seeds 1 or more in each cell. (p. 307.)

20. **Amaryllidaceae.** Perennial herbs, usually with bulbs or rootstocks; leaves narrow, entire. Flowers regular. Perianth petaloid, of 6 segments or leaflets. Stamens 6, distinct; anthers extrorse. Ovary inferior, 3-celled; ovules usually numerous in each cell. Fruit a 3-celled capsule; seeds with copious albumen. (p. 326.)

21. **Iridaceae.** Perennial herbs; leaves narrow, often equitant and ensiform. Flowers regular in the New Zealand species. Perianth petaloid, its tube adnate to the ovary, limb of 6 segments, marcescent. Stamens 3, inserted on the perianth; anthers extrorse. Ovary inferior, 3-celled; ovules numerous. Style-branches 3. Fruit a 3-celled capsule. (p. 327.)

Order VIII. **Microspermae.**

Herbaceous plants of very various size and habit of growth, the tropical species often epiphytic or saprophytic. Flowers regular and trimerous in the *Burmanniaceae*, very irregular in the *Orchidaceae*. Ovary inferior, 1-celled or 3-celled; ovules numerous, minute. Fruit a capsule; seeds minute, with a thin and membranous testa; albumen present or absent.

22. **Burmanniaceae.** Small slender annual or perennial herbs, mostly saprophytic, and often leafless. Leaves when present crowded at the base of the stem or scattered along it. Flowers solitary and terminal or cymose, usually regular and trimerous. Perianth gamophyllous. Stamens

3 or 6, inserted on the tube of the perianth. Ovary inferior, 1-celled or 3-celled. Fruit a capsule; seeds minute, testa more or less elongated; albumen present. (p. 329.)

23. **Orchidaceae.** Terrestrial or epiphytic plants of very various habit. Flowers hermaphrodite, irregular, either solitary or arranged in spikes, racemes, or panicles. Perianth petaloid, superior, of 6 more or less combined segments; the 3 outer (sepals) similar or nearly so; 2 of the inner ones (petals) lateral, alike; the third inner one (lip) dissimilar, usually larger and often spurred. Stamens variously united with the style and forming the column; anther 1 (2 in *Cypripedium*), 2-celled. Capsule 3-celled. Seeds numerous, minute; testa hyaline, reticulated. Albumen wanting. (p. 330.)

Subclass II. **DICOTYLEDONS.**

Stem consisting of a pith in the centre, of bark on the outside, and of interposed vascular tissue; when perennial increasing in diameter annually by the addition of a new layer of woody or vascular tissue to the outside of the old wood, and of a new layer of bark to the inside of the old bark. Leaves usually with reticulated veins. Parts of the flower generally in fours or fives or eights. Embryo usually with two opposite cotyledons.

Division I. ARCHICHLAMYDEAE.

Petals separate or distinct from each other, or wanting.

Order **Piperales.**

Flowers hermaphrodite or unisexual, arranged in a spike or spadix, bracteate. Perianth usually absent. Ovary generally superior, 1-celled; rarely inferior and of several carpels. Fruit drupaceous; seed with copious albumen.

24. **Piperaceae.** Herbs, shrubs, or small trees; leaves alternate or opposite. Flowers minute; perianth wanting. Stamens 2–6, hypogynous. Ovary superior; ovule erect, orthotropous. Fruit a berry. (p. 368.)

25. **Chloranthaceae.** Shrubs or small trees, leaves opposite. Flowers minute; perianth rudimentary. Stamens 1–3. Ovary inferior; ovule orthotropous, pendulous from the apex of the cell. Fruit a berry. (p. 371.)

Order **Fagales.**

Trees or shrubs; leaves alternate, stipulate. Flowers small, monoecious or rarely dioecious. Male flowers in spikes or in more or less capitate clusters. Perianth simple, 4–6-lobed. Stamens 5–20. Female flowers solitary or few together, surrounded by bracts, which are often combined into a lobed or entire involucre. Perianth adnate to the ovary, limb wanting or 3–6-lobed. Ovary inferior, 1–3-celled, ovules usually 2 in each cell. Fruit a 1-seeded nut.

26. **Fagaceae.** Trees or shrubs. Flowers monoecious, the males in spikes or capitate clusters; females enclosed by an involucre of partly or wholly united bracts. Stamens 4–20. Female perianth adnate to the 2–3-celled ovary; ovules 1–2 in each cell, but only one in each ovary ripens. Fruit enclosed in the persistent and more or less hardened involucre. (p. 372.)

Order **Urticales.**

Trees, shrubs, or herbs; leaves alternate or opposite, stipulate. Flowers small, generally unisexual. Perianth simple, 4–6-partite, or of 4–6 separate leaflets. Stamens usually as many as the divisions of the perianth. Ovary 1-celled, superior; ovule solitary, erect or pendulous.

27. **Moraceae.** Mostly trees or shrubs, with milky juice. Flowers monoecious or dioecious. Perianth 3–4-lobed or -partite. Stamens inflexed or straight in the bud. Ovary usually superior, 1-celled; ovule solitary, pendulous. Fruit small, 1-seeded, dry or rarely succulent. (p. 377.)

28. **Urticaceae.** Herbs or small trees, without milky juice; leaves often armed with stinging hairs. Flowers monoecious, dioecious, or polygamous. Perianth 2–5-partite or of separate leaflets. Stamens inflexed in the bud. Ovary superior, 1-celled; ovule solitary, orthotropous. Fruit small, dry or fleshy, 1-seeded. (p. 379.)

Order **Proteales.**

Trees or shrubs; leaves usually alternate. Flowers usually hermaphrodite. Perianth simple, 4-partite, segments valvate. Stamens 4, opposite to the perianth-segments and inserted upon them. Ovary 1-celled; ovules solitary or 2 collateral, rarely more. Albumen wanting.

29. **Proteaceae.** Characters as above. (p. 385.)

Order **Santalales.**

Herbs, shrubs, or small trees, often parasitic; leaves alternate or opposite, entire, exstipulate, sometimes reduced to minute scales or altogether absent. Flowers hermaphrodite or unisexual, conspicuous or of small size. Perianth usually simple, 3–5-partite. Stamens equal in number to the divisions of the perianth and inserted upon them. Ovary inferior or superior, 1-celled; ovules usually devoid of integument.

30. **Santalaceae.** Often parasitic or semiparasitic. Flowers small, greenish, solitary or in axillary or terminal cymes or spikes. Perianth superior or inferior, 3–6-lobed or -partite. Stamens inserted on the lobes. Ovary inferior or superior, 1-celled; ovules 1–4, pendulous from the summit of a central placenta. Fruit a drupe or nut; seed solitary. (p. 387.)

31. **Loranthaceae.** Semiparasitic shrubs, usually on trees, very rarely terrestrial; leaves usually opposite, sometimes wanting. Perianth sepaloid or petaloid, 4–5-partite. Stamens as many as the perianth-leaflets and inserted upon them. Ovary 1-celled, inferior, the ovules not differentiated from the placenta. Fruit a berry. Seed solitary; its testa not distinguishable from the endosperm. (p. 389.)

32. **Balanophoraceae.** Root parasites with a deformed tuberous rhizome, and with no true stem nor leaves. Flowers dioecious or monoecious, on many-flowered spadices. Perianth of the male flowers 3–4-lobed, absent in the female flowers or closely adnate to the ovary. Ovary with a single suspended ovule. (p. 396.)

Order **Polygonales.**

Mostly herbs, sometimes climbers, rarely small woody plants; leaves usually alternate; stipules scarious, forming a tubular sheath round the branch. Flowers usually hermaphrodite, but frequently monoecious or dioecious. Perianth regular, 3–6-partite, green or coloured. Stamens 3–9, inserted near the base of the perianth. Ovary superior, 1-celled; ovule solitary, basal, erect. Fruit a triangular or lenticular nut. Albumen mealy.

33. **Polygonaceae.** Characters as above. (p. 397.)

Order **Centrospermae.**

Herbs, rarely woody plants; leaves simple, exstipulate. Flowers usually perfect. Perianth single, or differentiated into calyx and corolla, usually hypogynous, pentamerous. Stamens in 1 or 2 series. Ovary superior, commonly 1-celled, with a single basal ovule, or with a free central placenta and many campylotropous ovules. Embryo curved, coiled or annular.

34. **Chenopodiaceae.** Annual or perennial herbs, rarely shrubs; leaves alternate or rarely opposite, often succulent or mealy-tomentose. Flowers small; bracts often suppressed. Perianth single, calycoid, 2–5-lobed or -partite, herbaceous. Stamens as many as the divisions of the perianth or fewer. Ovary 1-celled; ovule solitary, basal, amphitropous. Styles 1–3. Fruit a utricle, 1-seeded; endosperm mealy. (p. 403.)

35. **Amarantaceae.** Herbs or shrubs; leaves opposite or alternate, usually thin and entire. Flowers small, green or whitish, bracteolate. Perianth single, calycoid or sometimes petaloid, 2–5-partite, often dry and scarious. Stamens 1–5, usually opposite the perianth-segments, hypogynous. Ovary 1-celled; ovule solitary and basal, or rarely numerous. Styles 1–3. Fruit an indehiscent 1-seeded utricle. (p. 412.)

36. **Nyctaginaceae.** Trees, shrubs, or herbs; leaves usually opposite, exstipulate. Flowers hermaphrodite or unisexual, usually in cymose panicles. Perianth single, petaloid, base usually persistent and enclosing the fruit. Stamens variable in number, hypogynous. Ovary superior, 1-celled; ovule solitary, basal, erect. (p. 413.)

37. **Aizoaceae.** Herbs, rarely undershrubs, often succulent; leaves opposite or alternate. Flowers regular, usually hermaphrodite. Calyx-lobes 3–5. Petals numerous or wanting. Stamens few or many. Ovary inferior in the New Zealand genera, 3–8-celled; ovules 1 or many in each cell. Seeds albuminous. (p. 414.)

38. **Portulacaceae.** Herbs, rarely woody; leaves opposite or alternate, entire. Flowers regular and perfect, but unsymmetrical. Sepals 2, rarely more. Petals 4–5, hypogynous. Stamens hypogynous, equal in number to the petals or fewer, rarely more. Ovary 1-celled; ovules 2 or more; styles 2–5. Fruit a capsule, seeds 2–many. (p. 417.)

39. **Caryophyllaceae.** Herbs; leaves opposite and entire; stipules scarious or wanting. Flowers perfect or rarely unisexual, regular. Sepals 4–5, persistent, separate or united into a calyx-tube. Petals the same number. Stamens hypogynous or perigynous, twice as many as the sepals or fewer. Ovary 1-celled; ovules usually many; styles 2–5. Fruit a capsule; seeds many, albuminous. (p. 418.)

Order **Ranales.**

Herbs, shrubs, or trees, of very various appearance. Flowers hypogynous or perigynous, usually hermaphrodite. Calyx of separate sepals. Corolla usually present, composed of separate petals. Stamens generally hypogynous and more numerous than the sepals. Ovary or ovaries superior; carpels 1–many, usually distinct.

40. **Ranunculaceae.** Herbs with radical or alternate leaves, or climbers with opposite leaves. Sepals 3–15, frequently caducous and often petaloid. Petals usually the same number, but wanting in 3 of the New Zealand genera. Stamens indefinite, hypogynous. Carpels many or rarely solitary, 1-celled; ovules 1–many. Fruit of few or many achenes or follicles. (p. 429.)

41. **Magnoliaceae.** Trees or shrubs, often aromatic; leaves alternate, exstipulate in the New Zealand species. Flowers terminal or axillary. Sepals and petals together forming 3 or 4 series. Stamens indefinite, hypogynous. Carpels numerous on an elongated receptacle or few on a flat one, as in the New Zealand species. (p. 455.)

42. **Monimiaceae.** Trees or shrubs; leaves opposite, exstipulate. Perianth 4–10-lobed, imbricate. Stamens indefinite. Ovary of numerous 1-celled and 1-ovuled carpels. Embryo small; albumen fleshy. (p. 457.)

43. **Lauraceae.** Trees or shrubs with alternate leaves, or leafless twiners. Perianth 4–8-partite, imbricate. Stamens opposite the perianth-segments; anthers opening by deciduous valves. Ovary 1-celled; ovule solitary, pendulous. Fruit a berry. (p. 459.)

Order **Rhoedales.**

Herbs with alternate simple leaves and no stipules. Flowers regular and hermaphrodite. Sepals usually free. Petals free, rarely absent. Stamens hypogynous. Ovary superior, dimerous, 1-celled; placentas parietal.

44. **Cruciferae.** Herbs, very rarely slightly woody. Flowers usually small, in racemes or corymbs. Sepals 4, deciduous or rarely persistent. Petals 4, hypogynous, cruciate, generally clawed. Stamens 6, 4 of them longer than the others. Ovary compound, consisting of 2 united carpels, the parietal placentas united by a false dissepiment. Fruit a capsule. Seeds few or many; albumen wanting. (p. 462.)

Order **Sarraceniales.**

Herbs; leaves variously adapted for the capture of insects. Flowers hermaphrodite or unisexual, regular, sometimes monochlamydeous. Calyx 4–8-partite or the sepals distinct. Petals 4–5, usually hypogynous. Stamens 3–20, hypogynous or perigynous. Ovary syncarpous, superior or its base adnate to the calyx, usually 1–5-celled; ovules numerous. Fruit capsular; seeds numerous.

45. **Droseraceae.** Herbs; leaves radical or alternate, covered with glandular irritable hairs. Sepals and petals 4–5, imbricate in bud. Stamens the same number, hypogynous or perigynous. Ovary usually 1-celled; ovules many, on parietal placentas. Fruit capsular; seeds albuminous. (p. 475.)

Order **Rosales.**

Herbs, shrubs, or trees. Flowers regular or irregular, usually hermaphrodite. Calyx free or adnate to the ovary; lobes (or sepals) 4–5, rarely more. Stamens usually perigynous or epigynous. Carpels 1 or more, distinct or united into a compound ovary.

46. **Crassulaceae.** Succulent herbs, with entire opposite leaves and no stipules. Flowers usually regular. Calyx 3–5-partite. Petals 3–5, subhypogynous. Stamens the same number as the petals or twice as many. Carpels as many as the stamens, distinct, usually with a gland or scale at the base of each carpel. Ovules 2 to many. (p. 478.)

47. **Saxifragaceae.** Herbs, shrubs, or trees; leaves usually alternate, rarely stipulate. Flowers usually regular. Calyx inferior or superior, 4–5-lobed. Petals 4–5, perigynous or epigynous. Stamens 5–10. Ovary 2–5-celled; ovules usually numerous in each cell. Seeds albuminous. (p. 483.)

48. **Pittosporaceae.** Trees or shrubs; leaves alternate, exstipulate. Flowers regular. Sepals and petals 5 each. Stamens 5; anthers free. Fruit a coriaceous or woody 2–4-celled capsule; placentas the same number as the valves. Seeds albuminous; embryo minute. (p. 485.)

49. **Cunoniaceae.** Shrubs or trees with opposite or whorled coriaceous leaves, usually stipulate. Flowers usually regular, hermaphrodite. Calyx 4–5-lobed. Petals the same number. Stamens twice the number of the petals. Ovary 2-celled; ovules 2–many in each cell. Fruit a capsule. (p. 497.)

50. **Rosaceae.** Herbs, shrubs, or trees; leaves simple or compound, usually alternate and stipulate. Flowers generally regular. Calyx 4–5-lobed; tube inferior or enclosing the ovary, or (in some non-indigenous genera) adnate to the ovary. Petals 4–5. Stamens many, rarely few. Ovary of 1 or more free or connate carpels; ovules 1 or more in each carpel. Seeds without albumen. (p. 499.)

51. **Leguminosae.** Trees, shrubs, or herbs; leaves simple or compound, usually alternate and stipulate. Flowers irregular and papilionaceous in the New Zealand genera. Stamens 10 in the New Zealand genera, all or 9 of them combined into a tube sheathing the ovary and style. Ovary of a single carpel. Fruit a legume. Seeds without any albumen. (p. 512.)

Order **Geraniales.**

Herbs, shrubs, or trees. Calyx-sepals free and distinct. Corolla when present with free petals, but such are absent in the New Zealand species of *Euphorbiaceae* and in the *Callitrichaceae*. Stamens few, seldom more than twice the number of the sepals. Ovary superior, compound; ovules pendulous.

52. **Geraniaceae.** Herbs, rarely shrubs; leaves alternate or opposite, stipules usually present. Flowers regular or irregular. Sepals 3–5. Petals the same number, hypogynous. Stamens usually 10. Ovary 3–5-lobed and -celled; ovules 1–2 in each cell. Capsule splitting elastically from the axis into 3–5 cocci or carpels. (p. 531.)

53. **Oxalidaceae.** Herbs, often with creeping rhizomes or scaly bulbs; leaves alternate, usually 3–5-foliolate. Flowers regular. Sepals 5. Petals the same number. Stamens 10–15. Ovary 5-celled and 5-lobed; ovules 2–many in each cell. Capsule not splitting elastically into its carpels. (p. 535.)

54. **Linaceae.** Herbs, rarely shrubby; leaves alternate, entire, usually exstipulate. Flowers regular. Sepals 4–5. Petals 4–5, imbricated, often contorted. Stamens the same number, filaments monadelphous at the base. Ovary 3–5-celled; ovules 1–2 in each cell. Fruit capsular. (p. 536.)

55. **Rutaceae.** Trees or shrubs, rarely herbs; leaves opposite or alternate, often compound, gland-dotted, exstipulate. Sepals 4–5. Petals 4–5, hypogynous or perigynous. Stamens 8–10, inserted at the outer base of a fleshy disc. Ovary 3–5-lobed, or of 3–5 separate carpels; ovules 2 in each cell. Fruit capsular. Seeds albuminous. (p. 537.)

56. **Meliaceae.** Trees or shrubs; leaves alternate, usually compound, exstipulate. Flowers regular, hermaphrodite or unisexual. Calyx small, 4–5-lobed. Petals 3–7, free or connate or adnate to the staminal tube. Stamens usually twice as many as the petals, monadelphous. Disc free. Ovary entire, 3–5-celled; ovules 2 to each cell. (p. 540.)

57. **Euphorbiaceae.** Herbs, shrubs, or trees, usually with milky acrid sap; leaves generally alternate, stipulate. Flowers usually small, unisexual in *Euphorbia* reduced to single naked stamens surrounding a solitary pistil and enclosed within a calyx-like involucre). On other genera perianth wanting, or simple and calycine, or double with the inner whorl of 4–5 petals. Stamens 1–many. Ovary superior, 3-celled; ovules 1–2 in each cell. Seeds with copious albumen; embryo straight. (p. 541.)

58. **Callitrichaceae.** Aquatic or terrestrial herbs. Stems slender, often capillary; leaves opposite and entire. Flowers axillary, monoecious. Perianth wanting. Stamen solitary, filament elongated. Pistil solitary; ovary 4-celled; ovules 1 in each cell. Fruit compressed, 4-lobed, separating when ripe into 4 flat carpels. (p. 544.)

Order **Sapindales.**

Trees or shrubs, rarely herbs. Flowers typically pentamerous, usually regular. Sepals mostly distinct. Stamens rarely more than twice as many as the sepals, usually equal and opposite to them. Ovary superior, compound; ovules pendulous.

59. **Coriariaceae.** Shrubs, sometimes almost herbaceous; leaves opposite or in threes, simple, entire, exstipulate. Flowers regular. Sepals 5. Petals 5, free, becoming fleshy in fruit. Stamens 10, hypogynous. Disc wanting. Ovary of 5–10 free carpels; ovules solitary in each carpel. Styles as many as the carpels. Fruit of 5–10 indehiscent cocci, embraced by the fleshy and juicy petals. (p. 546.)

60. **Corynocarpaceae.** Medium-sized evergreen trees. Resin-canals wanting. Leaves alternate, simple, exstipulate. Flowers small, regular, hermaphrodite. Calyx inferior, 5-lobed. Petals 5, perigynous. Stamens 5, opposite to the petals. Disc reduced to 5 glandular lobes. Ovary 1-celled or imperfectly 2-celled. Ovule solitary, pendulous. Fruit drupaceous. (p. 548.)

61. **Stackhousiaceae.** Herbs; leaves alternate, simple and entire. Calyx 5-lobed. Petals 5, linear, free or connate above the base. Stamens 5. Ovary 2–5-lobed and -celled; styles 2–5; ovules solitary in each cell. Fruit of 2–5 cocci. (p. 549.)

62. **Icacinaceae.** Trees or shrubs, sometimes climbers; leaves usually alternate, exstipulate. Flowers regular, hermaphrodite or polygamo-dioecious. Calyx 4–5-toothed. Petals 4–5, free, hypogynous. Stamens 5, alternating with the petals. Disc present. Ovary 1-celled; ovules 1–2. Fruit a drupe. (p. 550.)

63. **Sapindaceae.** Trees or shrubs; leaves alternate, simple or compound, exstipulate or rarely stipulate. Flowers polygamo-dioecious, regular or somewhat irregular. Calyx 4–5-lobed or of 4–5 distinct sepals. Petals wanting in the New Zealand genera. Stamens 5–8, hypogynous or inserted within the disc. Disc fleshy. Ovary 1- or 2–3-celled; style simple; ovules 1 in each cell. (p. 550.)

Order **Rhamnales.**

Trees, shrubs, or woody climbers; leaves usually alternate, stipulate. Flowers small, regular, rarely apetalous. Calyx 4–5-lobed. Petals usually the same number as the calyx-lobes. Stamens 4–5, perigynous, opposite to the petals. Disc perigynous, intrastaminal. Ovary 2–3-celled; ovules solitary in each cell. Fruit a capsule or drupe.

64. **Rhamnaceae.** Shrubs or trees, often with stellate hairs; leaves usually alternate. Flowers regular. Calyx 2–5-lobed, valvate. Petals 4–5, often minute or wanting. Stamens as many as the petals and opposite to them, inserted on the margin of the disc. Ovary often inferior, 3-celled; style simple; ovules 1 in each cell. (p. 553.)

Order **Malvales.**

Herbs, shrubs, or trees; leaves simple, usually alternate, stipulate; stipules deciduous. Flowers regular, usually hermaphrodite. Calyx gamosepalous; lobes 4–5. Petals 4–5, rarely wanting. Stamens usually numerous, often monadelphous. Ovary superior, compound, the placentas united in its axis. Fruit capsular or drupaceous.

65. **Elaeocarpaceae.** Trees or shrubs; leaves alternate or opposite, stipulate. Flowers regular and hermaphrodite. Sepals 4–5, free, valvate. Petals the same number, free. Stamens numerous, seated on the torus; anthers linear, opening by a terminal slit or pore. Ovary 2–5-celled; ovules 2–many in each cell. Fruit a drupe or berry. (p. 556.)

66. **Tiliaceae.** Trees or shrubs, rarely herbs; leaves alternate or rarely opposite; stipules present, deciduous. Flowers hermaphrodite and regular. Sepals 5, deciduous. Petals the same number or fewer, rarely wanting. Stamens numerous, free or connate at the base; anthers 2-celled. Ovary 2–10-celled, ovules anatropous. (p. 559.)

67. **Malvaceae.** Herbs or shrubs or small trees; leaves alternate, stipulate. Flowers regular, hermaphrodite. Sepals 5, persistent. Petals 5, contorted in the bud. Stamens monadelphous; anthers 1-celled. Carpels either several connate into a ring, or forming a 5–10-celled capsule, rarely reduced to 1. (p. 560.)

Order **Parietales.**

Herbs, shrubs, or trees; leaves opposite or alternate. Flowers usually complete, perfect and regular, but irregular in *Violaceae*. Sepals distinct or more or less united. Petals free, but sometimes absent. Stamens generally numerous. Ovary compound, usually superior; placentas generally parietal.

68. **Guttiferae.** Herbs, shrubs, or trees; leaves opposite or whorled, often gland-dotted. Flowers hermaphrodite or unisexual. Sepals 4–6, imbricate in bud. Petals the same number. Stamens numerous, free or polyadelphous. Ovary 3–5-celled; ovules numerous; styles 3–5. (p. 567.)

69. **Elatinaceae.** Herbs or small shrubs, often aquatic; leaves opposite, stipulate. Flowers regular and hermaphrodite. Sepals 2–5. Petals the same number. Stamens equal in number to the petals or twice as many. Ovary 2–5-celled; ovules many; styles 2–5. (p. 568.)

70. **Violaceae.** Herbs or shrubs or small trees; leaves alternate, stipulate. Flowers regular or irregular. Sepals 5. Petals 5, the anterior one often spurred. Stamens 5, alternate with the petals, hypogynous, connivent into a ring surrounding the ovary; connective usually dilated above the anther-cells. Ovary free, 1-celled, with 3–5 parietal placentas. (p. 569.)

71. **Passifloraceae.** Usually scandent shrubs with lateral tendrils; leaves alternate, simple or compound, usually palmately-lobed. Flowers regular, hermaphrodite or unisexual. Calyx-lobes 4–5. Petals 3–5, often with a crown of filaments at their base. Stamens usually the same number as the petals. Ovary superior, free, elevated on a stalk or gynophore. Fruit succulent or coriaceous; seeds many. (p. 576.)

Order **Myrtiflorae.**

Trees, shrubs, or herbs; leaves various. Flowers usually with both calyx and corolla, but in some families (*Thymelaeaceae* and its allies and some species of *Haloragidaceae*) the flowers are apetalous. Calyx-lobes 2–5. Petals (when present) 2–5, usually epigynous. Stamens few or many. Ovary compound, usually inferior, 2–5-celled.

72. **Thymelaeaceae.** Shrubs or rarely herbs; bark tough and stringy; leaves opposite or alternate, exstipulate. Flowers hermaphrodite or polygamous. Perianth petaloid, tubular, 4–5-lobed. Stamens 2–4, inserted on the perianth-tube. Ovary 1–2-celled, ovules solitary in each cell, pendulous. (p. 577.)

73. **Myrtaceae.** Trees or shrubs; leaves opposite or alternate, ex-stipulate, usually gland-dotted. Flowers regular and hermaphrodite. Calyx-lobes 4–5, valvate or imbricate. Petals the same number, epigynous. Stamens numerous. Ovary inferior, or half-inferior; 1–many-celled; ovules few or many in each cell. (p. 587.)

74. **Onagraceae.** Herbs or more rarely shrubs or trees; leaves opposite or alternate, exstipulate. Flowers regular and hermaphrodite. Calyx-lobes valvate. Petals 2–4, epigynous, contorted in bud. Stamens 2, 4, or 8. Ovary inferior, 2–4-celled, ovules numerous in each cell. Fruit usually capsular or berried. (p. 598.)

75. **Haloragidaceae.** Herbs, terrestrial or aquatic. Flowers often much reduced, but generally hermaphrodite or unisexual. Calyx-limb 2–4-toothed or wanting. Petals 2–4 or wanting. Stamens 2–4, epigynous. Ovary 1–4-celled; ovules solitary and pendulous in each cell; styles 1–4. Seeds albuminous. (p. 619.)

Order **Umbellifloreae.**

Herbs, shrubs, or trees. Flowers regular, hermaphrodite. Calyx-segments and petals nearly always 5. Stamens 4–5. Ovary inferior, 1–2–many-celled; ovules solitary in each cell, pendulous; styles free or connate at the base. Seeds albuminous; embryo usually minute.

76. **Araliaceae.** Trees or shrubs, rarely herbs; leaves simple or 1–7-foliate, usually stipulate. Calyx-lobes 5 or obsolete. Petals valvate, rarely imbricate. Stamens 5. Ovary inferior, 2–10-celled; styles as many as the cells, ovules solitary in each cell. Fruit often succulent. (p. 630.)

77. **Umbelliferae.** Herbs, often aromatic; stems often fistular; leaves alternate, frequently much dissected, exstipulate. Flowers hermaphrodite. Calyx-lobes 5 or obsolete. Petals imbricate, rarely valvate. Ovary inferior, 2-celled; styles 2; ovules solitary in each cell. Fruit separating into 2 dry indehiscent carpels. (p. 643.)

78. **Cornaceae.** Shrubs or trees; leaves simple, alternate in the New Zealand species. Flowers hermaphrodite or unisexual. Calyx-lobes 4–5. Petals 4–5 or wanting. Stamens 4–5. Ovary inferior, 1–2-celled; ovules solitary in each cell. Fruit succulent, indehiscent. (p. 685.)

Division II. SYMPETALAE.

Petals more or less united to one another.

Order **Ericales.**

Shrubs or herbs; leaves simple, exstipulate. Flowers regular, hermaphrodite, 4–5-merous. Corolla hypogynous. Stamens as many or twice as many as the corolla-lobes, epipetalous or hypogynous. Ovary superior, 1–many-celled; cells with 1–many ovules. Seeds minute.

79. **Ericaceae.** Shrubs or trees; leaves opposite or alternate, exstipulate. Corolla 4–5-lobed or rarely polypetalous. Stamens usually 8–10, almost free from the corolla; anthers 2-celled, opening by 2 terminal pores. Fruit a capsule, berry, or drupe. (p. 688.)

80. **Epacridaceae.** Shrubs or undershrubs; leaves alternate, entire, exstipulate. Corolla hypogynous, 4–5-lobed. Stamens 4–5 or rarely 8–10; anthers 1-celled, dehiscing lengthwise. Ovary 2–many-celled; ovules 1–many in each cell. Fruit a capsule or drupe. (p. 692.)

Order **Primulales.**

Herbs, shrubs, or trees; leaves usually alternate, exstipulate. Flowers regular, hermaphrodite or unisexual. Corolla hypogynous, or rarely epigynous. Stamens equalling the corolla-lobes and opposite to them, hypogynous or epipetalous. Ovary 1-celled; ovules on a free central placenta.

81. **Myrsinaceae.** Trees or shrubs; leaves usually alternate, gland-dotted, exstipulate. Flowers hermaphrodite or polygamous. Corolla 4–5-lobed or -partite (lobes free in most of the New Zealand species). Stamens as many as the corolla-lobes and opposite to them. Ovary 1-celled; ovules numerous on a free central placenta. Fruit succulent, indehiscent. (p. 711.)

82. **Primulaceae.** Herbs; leaves radical, alternate, opposite, or whorled. Flowers usually regular and hermaphrodite. Corolla 4–5-lobed, hypogynous. Stamens as many as the corolla-lobes and opposite to them. Ovary 1-celled, inferior; ovules many, on a free central placenta. Fruit capsular, many-seeded. (p. 715.)

Order **Ebenales.**

Trees or shrubs; leaves usually alternate and simple. Flowers regular, hermaphrodite or unisexual. Stamens equal to the corolla-lobes or twice as many as them. Ovary 2–many-celled; seeds few or solitary.

83. **Sapotaceae.** Trees, often with milky juice; leaves entire. Corolla 4–8-lobed; stamens affixed to the corolla. Ovary 4–8-celled; ovules solitary in each cell. Fruit an indehiscent berry; frequently 1-seeded by abortion. (p. 716.)

Order **Contortae.**

Trees, shrubs, or herbs; leaves usually opposite, simple, and exstipulate. Corolla gamopetalous, rarely absent, regular. Stamens usually affixed to the lower part of the corolla-tube, as many as its lobes or fewer, and alternate with them. Ovaries 2, distinct, or 1 with 2 cells or 2 placentae.

84. **Oleaceae.** Trees or shrubs, rarely herbs; leaves opposite or rarely whorled, exstipulate. Corolla 4–5-lobed, absent in the New Zealand species. Stamens 2, alternating with the carpels. Ovary 2-celled; ovules 1–2 in each cell, affixed to the septum. Fruit a drupe or berry, or a 2-valved loculicidal capsule. (p. 717.)

85. **Loganiaceae.** Trees or shrubs, rarely herbs; leaves opposite, often connected by interpetiolar stipules. Corolla 4–5-lobed. Stamens as many as the corolla-lobes and alternate with them. Ovary 2-celled; cells 1–many in each cell. Fruit various. (p. 720.)

86. **Gentianaceae.** Usually glabrous herbs, with a bitter taste; leaves usually opposite, quite entire, exstipulate. Corolla regular, 4–5-lobed. Stamens as many as the corolla-lobes and alternate with them. Ovary 1-celled; placentas 2, parietal; ovules numerous. Fruit capsular. (p. 723.)

87. **Apocynaceae.** Trees or erect or twining shrubs, rarely herbs; leaves usually opposite, exstipulate. Corolla 4–5-lobed, contorted in the bud. Stamens 4–5, alternate with the corolla-lobes; anthers sagittate, connivent round the stigma. Ovary of 2 more or less distinct carpels; styles connected; ovules numerous. (p. 737.)

Order **Tubiflorae.**

Usually herbs, more rarely shrubs or trees; leaves alternate or wanting, exstipulate. Corolla hypogynous, gamopetalous. Stamens as many as the

corolla-lobes and inserted on the tube, or fewer and alternate with them. Ovary 1–5-celled, syncarpous; cells 1–2 or more rarely many-ovuled. Embryo albuminous.

88. **Convolvulaceae.** Herbs, usually twining, more rarely shrubs; leaves alternate (wanting in *Cuscuta*), exstipulate. Corolla-lobes 4–5, regular, plicate or angled, contorted in the bud. Stamens 4–5, adnate to the corolla-tube. Ovary of 2–4 cells or carpels; ovules 1–2 in each cell. Fruit usually capsular. (p. 739.)

89. **Boraginaceae.** Herbs, often hispid or scabrid; leaves alternate, exstipulate; inflorescence scorpioid. Corolla perfect and regular, 5-lobed; lobes imbricate. Stamens as many as the corolla-lobes and alternate with them. Ovary 4-lobed to the base, consisting of 2 2-lobed and 2-celled carpels; ovules solitary in each cell. Fruit separating into 4 indehiscent nutlets. (p. 745.)

90. **Verbenaceae.** Trees, shrubs, or herbs; leaves opposite or whorled rarely alternate, exstipulate. Flowers irregular or rarely regular; corolla often 2-lipped. Stamens 4, didynamous, rarely reduced to 2. Ovary 2–4-celled, ovules 1–2 in each cell. Fruit drupaceous or capsular. (p. 763.)

91. **Labiatae.** Aromatic herbs, with quadrangular stems; leaves opposite or whorled, exstipulate. Flowers irregular and perfect. Corolla usually 2-lipped. Stamens 4, didynamous or subequal, rarely reduced to 2. Ovary 4-lobed, composed of 2 2-partite carpels; ovule solitary in each lobe. Fruit of 4 indehiscent nutlets. (p. 765.)

92. **Solanaceae.** Shrubs or herbs; leaves alternate, exstipulate. Corolla usually regular, 5-lobed; lobes plaited or imbricate. Stamens 5, inserted on the lobes of the corolla and alternate with them. Ovary 2-celled, placentas axile, ovules numerous in each cell. Fruit baccate or capsular. (p. 767.)

93. **Scrophulariaceae.** Shrubs or herbs; leaves alternate or rarely opposite, exstipulate. Flowers perfect, usually irregular. Corolla 2-lipped or nearly regular; lobes 4–5, imbricate. Stamens 2, or 4 or 5, didynamous or nearly equal, inserted on the corolla and alternate with its lobes. Ovary 2-celled; placentas axile; ovules numerous. Fruit usually capsular. (p. 769.)

94. **Gesneriaceae.** Trees, shrubs, or herbs; leaves simple, opposite. Corolla more or less 2-lipped; lobes 5, imbricate. Stamens usually 4, didynamous, sometimes reduced to 2. Ovary 1-celled; placentas 2, parietal; ovules numerous. Fruit mostly capsular. (p. 845.)

95. **Lentibulariaceae.** Small water-plants, usually furnished with minute bladders which catch small aquatic animals. Corolla 2-lipped; stamens 2. Ovary 1-celled; ovules numerous on a free central placenta. Fruit capsular. (p. 846.)

96. **Myoporaceae.** Shrubs or trees; leaves alternate, usually gland-dotted. Corolla subregular in the New Zealand species. Stamens 4, didynamous or nearly equal. Ovary 2–4-celled, with 2 ovules in each cell. Fruit drupaceous; seeds albuminous; radicle superior. (p. 849.)

Order **Plantaginales.**

Composed of the following family alone :—

97. **Plantaginaceae.** Herbs; leaves usually all radical. Flowers regular. Corolla 4-lobed, scarious. Stamens 4, or rarely 2 only, inserted on the throat of the corolla; anthers pendulous. Ovary 2-celled, or spuriously 4-celled; ovules 1 or several in each cavity of the ovary. Fruit a capsule with transverse dehiscence. (p. 850.)

Order **Rubiales.**

Trees, shrubs, or herbs; leaves opposite, usually simple. Corolla gamopetalous; stamens as many as the corolla-lobes and alternate with them, or twice as many; anthers free. Ovary inferior, adnate to the calyx-tube; cells 1–many; each with 1–many ovules. Fruit various.

98. **Rubiaceae.** Herbs, shrubs, or trees; leaves opposite or sometimes verticillate; usually furnished with interpetiolate stipules. Flowers regular. Calyx-lobes 4–5 or obsolete; corolla-lobes the same number. Stamens as many as the corolla-lobes, and inserted on its throat; anthers free. Ovary inferior, 1–10-celled; ovules solitary in each cell in the New Zealand species. (p. 854.)

99. **Caprifoliaceae.** Shrubs, trees, or herbs; leaves opposite or alternate; stipules wanting. Flowers regular in the New Zealand species. Calyx-lobes 4–5; corolla-lobes the same number. Stamens 4–5, inserted on the tube of the corolla; anthers free. Ovary inferior, 2-celled; ovules several in each cell. Fruit usually a berry. (p. 880.)

Order **Cucurbitales.**

Herbs or rarely undershrubs, mostly climbing or trailing; leaves alternate, broad, entire or lobed; tendrils often present. Flowers unisexual, rarely hermaphrodite. Calyx-tube adnate to the ovary; limb 5-lobed. Petals 5, epigynous, free or united into a gamopetalous corolla. Stamens 3, rarely 5, often more or less coherent. Ovary inferior, usually 3-celled; ovules generally many, anatropous. Fruit large, fleshy.

100. **Cucurbitaceae.** Characters as above. (p. 882.)

Order **Campanulatae.**

Herbs, more rarely shrubs or trees; leaves alternate, rarely opposite, exstipulate. Flowers typically 5-merous; regular or irregular. Corolla gamopetalous. Stamens as many as the corolla-lobes, epipetalous or epigynous; anthers often united. Ovary inferior; either 1-celled with a single ovule, or with several cells with 1–many ovules in each.

101. **Campanulaceae.** Herbs, or in some species not found in New Zealand shrubs or even trees; sap acrid and often milky. Flowers regular or irregular. Stamens 5, free or connate into a tube surrounding the style; anthers introrse. Ovary inferior, 2–8-celled; ovules usually numerous in each cell. Fruit a capsule or berry. (p. 883.)

102. **Goodeniaceae.** Herbs or undershrubs; leaves simple, alternate, exstipulate. Flowers irregular, hermaphrodite, 5-merous. Stamens 5, free from the style. Ovary inferior, 1–2-celled; ovules 1–2 in each cell or numerous; style with a cup-shaped appendage below the stigma. Fruit a capsule or berry. (p. 893.)

103. **Stylidiaceae.** Herbs or undershrubs, usually of small size; leaves small, entire, exstipulate. Flowers regular or irregular, hermaphrodite or unisexual, usually 5-merous. Corolla 5-lobed; lobes imbricate. Stamens 2–3; filaments usually confluent with the style into a central column; anthers extrorse. Ovary 1–2-celled; ovules numerous in each cell. Capsule septicidal or indehiscent. (p. 895.)

104. **Compositae.** Herbs, shrubs, or trees; leaves usually alternate, rarely opposite, seldom stipulate. Flowers small, massed in involucrate heads. Calyx-limb reduced to pappus hairs or scales or wanting. Anthers connate into a tube sheathing the style. Ovary 1-celled; ovule solitary, erect. Seed dry, exalbuminous. (p. 900.)

ARRANGEMENT OF THE NEW ZEALAND FAMILIES OF PLANTS ACCORDING TO THE CLASSIFICATION FOLLOWED IN HOOKER AND BENTHAM'S "GENERA PLANTARUM."

CLASS I. DICOTYLEDONS.

SERIES I. **THALAMIFLORAE.**

Cohort **Ranales.**

1. Ranunculaceae. 2. Magnoliaceae (equivalent to Families 40 and 41 of the previous arrangement).

Cohort **Parietales.**

3. Cruciferae (44). 4. Violaceae (70).

Cohort **Polygalinae.**

5. Pittosporaceae (48).

Cohort **Caryophyllinae.**

6. Caryophyllaceae (39). 7. Portulaceae (38). 8. Elatinaceae (69). 9. Hypericaceae (68).

Cohort **Malvales.**

10. Malvaceae (67). 11. Tiliaceae (65, 66).

SERIES II. **DISCIFLORAE.**

Cohort **Geraniales.**

12. Linaceae (54). 13. Geraniaceae (52). 13. Oxalidaceae (part 52). 14. Rutaceae (55). 15. Meliaceae (56).

Cohort **Olacales.**

16. Olacaceae (62).

Cohort **Celastrales.**

17. Stackhousiaceae (61). 18. Rhamnaceae (64).

Cohort **Sapindales.**

19. Sapindaceae (63). 20. Corynocarpaceae (60). 21. Coriariaceae (59).

Series III. **CALYCIFLOREAE.**

Cohort **Rosales.**

22. Leguminosae (51). 23. Rosaceae (50). 24. Saxifragaceae (47). 25. Crassulaceae (46). 26. Droseraceae (45). 27. Haloragaceae (75).

Cohort **Myrtaceae.**

28. Myrtaceae (73). 29. Onagraceae (74).

Cohort **Passiflorales.**

30. Passifloraceae (71). 31. Cucurbitaceae (100).

Cohort **Ficoidales.**

32. Ficoideae = Aizoaceae (37).

Cohort **Umbellales.**

33. Umbelliferae (77). 34. Araliaceae (76). 35. Cornaceae.

Series IV. **GAMOPETALAE.**

Cohort **Rubiales.**

36. Caprifoliaceae (99). 37. Rubiaceae (98).

Cohort **Asterales.**

38. Compositae (104).

Cohort **Campanales.**

39. Stylidiaceae (103). 40. Goodeniaceae (102). 41. Campanulaceae (101).

Cohort **Ericales.**

42. Ericaceae (79). 43. Epacridaceae (80).

Cohort **Primulales.**

44. Primulaceae (82). 45. Myrsinaceae (81).

Cohort **Ebenales.**

46. Sapotaceae (83).

Cohort **Gentianales.**

47. Oleaceae (84). 48. Apocynaceae (87). 49. Loganiaceae (85). 50. Gentianaceae (86).

Cohort **Polemoniales.**

51. Boraginaceae (89). 52. Convolvulaceae (88). 53. Solanaceae (92).

Cohort **Personales.**

54. Scrophulariaceae (93). 55. Lentibulariaceae (95). 56. Gesneriaceae (94).

Cohort **Lamiales.**

57. Myoporaceae (96). 58. Verbenaceae (90). 59. Labiatae (91).

Cohort **Plantagenales.**

60. Plantaginaceae (97).

Series V. **MONOCHLAMYDEAE.**

Cohort **Chenopodiales.**

61. Nyctaginaceae (36). 62. Illecebraceae (part 39). 63. Amarantaceae (35). 64. Chenopodiaceae (34). 65. Polygonaceae (33).

Cohort **Piperales.**

66. Piperaceae (24). 67. Chloranthaceae (25).

Cohort **Laurales.**

68. Monimiaceae (42). 69. Lauraceae (43).

Cohort **Daphnales.**

70. Proteaceae (29). 71. Thymelaeaceae (72).

Cohort **Santalales.**

72. Loranthaceae (31). 73. Santalaceae (30). 74. Balanophoraceae (32).

Cohort **Euphorbiales.**

75. Euphorbiaceae (57).

Cohort **Urticales.**

76. Urticaceae (27, 28).

Cohort **Quernales.**

77. Cupuliferae (26).

Subclass II. GYMNOSPERMAE.

78. Coniferae (6 and 7).

Class II. MONOCOTYLEDONS.

Cohort **Orchidales.**

79. Orchidaceae (23). 79a. Burmanniaceae.

Cohort **Narcissales.**

80. Iridaceae (21). 81. Amaryllidaceae (20).

Cohort **Liliales.**

82. Liliaceae (19). 83. Juncaceae (18).

Cohort **Palmales.**

84. Palmae (14).

Cohort **Arales.**

85. Pandanaceae (9). 86. Typhaceae (8, 10). 87. Lemnaceae (15).

Cohort **Potamales.**

88. Naiadaceae (11).

Cohort **Restiales.**

89. Centrolepidaceae (17). 90. Restiaceae (16).

Cohort **Glumales.**

91. Cyperaceae (13). 92. Gramineae (12).

Subkingdom **CRYPTOGAMIA.**

Class PTERIDOPHYTA.

Cohort **Filicales.**

93. Filices (1). 94. Marsileaceae (2). 95. Salviniaceae (3). 96. Lycopodiaceae (4). 97. Isoetaceae.

For subst. list see Trans 65 : 1935 : 1–8.
also Nat Hb N.Z. HHA 1940.

II. LIST OF PLANTS NATURALIZED IN NEW ZEALAND.

The extent to which an alien vegetation has become established in New Zealand has long been a familiar fact. Immediately after the discovery of the country and the establishment of intercourse with other parts of the world a stream of foreign plants commenced to pour in; and when European settlers arrived, bringing with them their flocks and herds, and began to clear away the indigenous vegetation to make room for pastures and cultivated fields, the inrush of foreign weeds became still more marked, and their spread through the country still more rapid. At the present time there are many districts where the indigenous flora has been almost entirely supplanted by a crowd of hardy immigrants from the Northern Hemisphere; and there are few localities indeed, however remote, in which some species of foreign origin have not successfully established themselves. This is not the place to inquire into the reasons why the native vegetation is apparently unable to hold its own against these foreign intruders, or to discuss the many curious side-issues which at once arise when the subject is under consideration. Those who are interested in the matter should refer to Mr. Kirk's memoir "On the Displacement of Species in New Zealand" (Trans. N.Z. Inst. xxviii, 1), and to a paper of my own on "The Naturalized Plants of the Auckland Provincial District" (Trans. N.Z. Inst. xv, 268).

In the subjoined catalogue I have included all species of foreign origin known to me which appear to be thoroughly well established. I have purposely omitted several garden escapes and other plants which have been observed in small quantity only, or in a single locality, not wishing to encumber the list with the names of species which may fail to become permanent denizens. The total number of plants recorded is 528, belonging to 285 genera, and included in 66 families. The families best represented are *Gramineae* with 81 species; *Compositae*, 70; *Leguminosae*, 49; *Cruciferae*, 35; *Caryophylleae*, 26; and *Labiatae*, 20. With respect to their native country, no less than 425 come from some portion of the North Temperate Zone, including in the term Europe, North Asia, part of North Africa, and part of North America; 41 are of tropical origin, most of them having very wide ranges; 19 are from South Africa, and 20 from extra-tropical South America; while from Australia, notwithstanding its proximity to New Zealand, only 23 have been received.*

Many of the naturalized plants included in the catalogue are now so widely distributed that they will be taken for true natives by any one unacquainted with their history, and I fear that the pages of this work will be searched in vain for descriptions of them. A supplementary volume, containing short diagnoses of all such species, would doubtless be a great convenience to students, and I am not without hopes that I may be enabled to undertake the work. In the meantime, I have inserted in the catalogue references to good descriptions of each species, selecting books that are likely to be contained in the chief public libraries of the Dominion.

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* The above figures refer to the list of naturalized plants printed in the first edition of this work. The corresponding figures for the list following are: Total number of species 576, genera 320, families 78; *Gramineae* 88, *Compositae* 77, *Leguminosae* 51, *Cruciferae* 36, *Caryophyllaceae* 26, *Labiatae* 20; north temperate regions 463, tropical regions 45, South Africa 21, South America 20, Australia 28.—W. R. B. O.

EQUISETACEAE.

Equisetum arvense Linn. Sp. Plant, ed. ii (1763) 1516; Hook. f. Student's Fl. 521. *Field-horsetail.* North Island: Near Wanganui, *J. McGregor!* (North America; Europe; and Asia, extending eastwards as far as Japan.)

SELAGINELLACEAE.

Selaginella denticulata Link. Fil. Berol. 159; Baker Fern Allies (1887) 37. Common in moist ground near Pakaraka, Bay of Islands, *T. H. Trevor!* near Kaitaia, *H. Carse;* and in several localities near Wellington, *B. C. Aston.* (Mediterranean region, from Syria to North Africa and the Canary Islands; often cultivated in gardens.)

PINACEAE.

So many species of *Coniferae* are now being planted for forestry purposes in New Zealand that I cannot doubt that many species additional to the following are spontaneously increasing. Whether they are also intruding into fresh ground after the fashion of truly naturalized plants I am not so certain.

Pinus pinaster Ait. Hort. Kew, ed. 1, iii, 367 (*P. maritima* Lam.). Reproduces itself from the seeds of planted trees, and is now to be seen in many localities in both the North and South Islands. (Mediterranean region.)

Pinus radiata D. Don in Trans. Linn. Soc. xvii (1837) 442; *P. insignis* Dougl., Watson Bot. Calif. ii, 127. Now universally planted in most parts of the Dominion, and reproducing itself in many localities. (California, coast ranges between San Francisco and Monterey.)

Pinus halepensis Miller Gard. Dict. ed. viii, n. 8. Has been largely planted in the Canterbury Plains, where, I am informed, it is reproducing itself very freely. (Mediterranean region.)

Pinus ponderosa Douglas in Lond. Arbor. iv, 2243. "*Yellow-pine.*" Has been largely planted in both the North and South Islands, and regenerates itself with great readiness. (British Columbia to California and Mexico.)

Pinus Laricio Poir. Encycl. v (1817) 339. *Corsican Pine.* Has been extensively planted in both the North and South Islands, and is said to reproduce itself freely. (South Europe.)

Pseudotsuga taxifolia Britton in Trans. New York Acad. Sci. viii (1889) 74. *Douglas Spruce.* Said to reproduce itself with great readiness both at Hanmer and Rotorua. (British Columbia and Oregon southwards to California and Mexico.)

Larix decidua Miller Gard. Dict. ed. viii, n. 1. Reported to be regenerating itself with great readiness in the Government plantations at Rotorua, Hanmer, and elsewhere. (Europe; North Asia.)

APONOGETONACEAE.

Aponogeton distachyon Linn. f. Suppl. 215; A. Bennett in Fl. Cap. vii (1897) 45. In streams at Waimate, Bay of Islands, not uncommon; ponds near Te Aroha, *B. Neve!* and near Wellington, *T. F. C.* (South Africa.)

ALISMACEAE.

Alisma Plantago Linn. Sp. Plant. (1753) 342; Hook. f. Student's Fl. 427. *Water-plantain.* North and South Islands: Watercourses in the Hawke's Bay District, *H. Hill! A. Hamilton!* streams near Marton, *W. Townson!* Tokomairiro River, Otago, *Petrie!* (Europe; North and West Asia to the Himalayas; Australia.)

BUTOMACEAE.

Hydrocleis nymphaeoides Buchen. in Bremen Abh. ii (1871) 2; and in Pflanzenf. Teil 2, 234, fig. 178. Ponds and backwaters in the Thames Valley near Te Aroha, *B. Neve!* (Brazil.)

HYDROCHARIDACEAE.

Elodea canadensis Michx. Fl. Bor. Am. i, 20; Hook. f. Student's Fl. 382. *Water-thyme.* North and South Islands: Clear slow-running streams. Near Kaitaia, *R. H. Matthews!* Bay of Plenty, *T. Kirk;* near Featherston, *K. W. Allison!* River Avon, and other streams on the Canterbury Plains, *A. M. Johnson! T. F. C.* (Originally from North America; now copiously naturalized in Europe.)

Vallisneria spiralis Linn. Sp. Plant. 1015; Benth. Fl. Austral. vi, 259. North Island: Abundantly naturalized in Lake Takapuna, near Auckland. South Island: Avon River, near Christchurch, *A. M. Johnson*. See Trans. N.Z. Inst. xxix, 386. (Most tropical countries.)

Ottelia ovalifolia L. Rich. in Mem. Hist. Soc. Par. (1811) 78; Benth. Fl. Austral. vi, 257. North Island. First noticed by the author in 1897 in ponds near the Manukau Harbour, now (1923) abundant in lakes and rivers from Mangonui and Kaitaia southwards to the Waikato and Thames Rivers. Quite lately it has appeared at Hawera (*G. M. Thomson*), near Marton (*W. Townson!*), and Feilding (*H. H. Allan!*). (Australia.)

GRAMINEAE.

Andropogon annulatus Forsk. Fl. Egypt. Arab. 173; Benth. Fl. Austral. vii, 531. North Island: Waste places at Mangonui, *T. F. C.* (Tropical Asia and Africa; Australia.)

Themeda Forskalii Hack. in Pflanzenf. ii, 2 (1887) 126; *Anthistiria imberbis* Retz. Obser. iii, 11; *A. ciliata* Benth. Fl. Austral. vii, 542 (not of Linn. f.). *Kangaroo-grass.* North Island: Fields and waste places, rare. Whangaparaoa, near Auckland; vicinity of Wellington, *T. Kirk!* (Tropical Asia; tropical and South Africa; Australia.)

Paspalum dilatatum Poir. Encycl. v, 35. Now widely sown as a pasture grass, and increasing rapidly. North and South Islands: Common in pastures and by roadsides from the North Cape to South Canterbury. (South America.)

Panicum sanguinale Linn. Sp. Plant. 57; Benth. Fl. Austral. vii, 469. *Crab-grass.* North and South Islands: Waste places and cultivated grounds, a common weed. (Most warm countries.)

Panicum glabrum Gaud. Agrost. i, 22; Hook. f. Student's Fl. 469. North Island: An occasional weed in cultivated ground, but not nearly as common as the preceding. (Most warm countries.)

Panicum Crus-galli Linn. Sp. Plant. 56; Hook. f. Student's Fl. 469. *Cockspur-grass.* North and South Islands: Waste places as far south as Canterbury, not uncommon. (Most warm countries.)

Panicum colonum Linn. Syst. ed. x, 870; Benth. Fl. Austral. vii, 478. North Island: Waste places from Auckland to Wellington, rare. (Most warm countries.)

Panicum Lindheimeri Nash in Bull. Torr. Bot. Club (1897) 196. North Island: Vicinity of Kaitaia, not common, but spreading, *H. B. Matthews!* (North America, from Maine to Florida, and westwards to California.)

Setaria glauca Beauv. Agrost. 51; Benth. Fl. Austral. vii, 492. North and South Islands: Waste places and cultivated fields, not uncommon. (Most warm and many temperate countries.)

Setaria verticillata Beauv. Agrost. 51; Benth. Fl. Austral. vii, 494. North and South Islands: Waste places at Napier, *Colenso!* Nelson, *R. J. Kingsley!* (A common weed in many warm and temperate countries.)

Setaria viridis Beauv. Agrost. 51; Benth. Fl. Austral. vii, 494. North Island: Waste places and cultivated fields, not uncommon. (Most warm climates.)

Stenotaphrum glabrum Trin. Fund. Agrost. 176; *S. americanum* Schrank Pl. Rar. Hort. Monac. 98. *Buffalo-grass.* A common escape from cultivation, especially near the sea. (Tropics of both hemispheres.)

Zizania aquatica Linn. Sp. Plant. 991; Asa Gray Man. 540. *Canadian Wild Rice.* North Island: Copiously naturalized by the Northern Wairoa River, between Te Kopuru and Dargaville, and increasing fast. (North America; North-eastern Asia.)

Phalaris canariensis Linn. Sp. Plant. 54; Hook. f. Student's Fl. 471. *Canary-grass.* North and South Islands: Fields and waste places, abundant. (South Europe; North Africa.)

Phalaris arundinacea Linn. Sp. Plant. 55; Hook. f. Student's Fl. 472. *Reed-grass.* North Island: By the Waikato River, near Mercer, *T. F. C.*; vicinity of Wellington, *T. Kirk.* (Europe; North and West Asia to India.)

Anthoxanthum odoratum Linn. Sp. Plant. 28; Hook. f. Student's Fl. 472. *Sweet Vernal-grass.* North and South Islands, Stewart Island: Meadows and pastures, common throughout. (Europe; North Asia.)

Stipa verticillata Nees in Spreng. Syst. iv, Cur. Post. 30. North and South Islands: Not common. Wellington, *T. Kirk!* near Nelson, *W. T. L. Travers.* (Australia.)

Phleum pratense Linn. Sp. Plant. 59; Hook. f. Student's Fl. 457. *Timothy.* North and South Islands: Abundant. (Europe; North and West Asia; North Africa.)

Alopecurus pratensis Linn. Sp. Plant. 60; Hook. f. Student's Fl. 474. *Meadow-foxtail.* North and South Islands: Meadows and pastures, not uncommon. (Europe; North Asia.)

Alopecurus myosuroides Hudson Fl. Angl. 23; Bab. Brit. Bot. ed. x, 487; *A. agrestis* Linn. Sp. Plant. ed. ii, 89. *Slender Foxtail.* North and South Islands: Fields and roadsides, not uncommon. (Europe; North and West Asia.)

Polypogon monspeliensis Desf. Fl. Atlant. i, 66; Hook. f. Student's Fl. 478. *Beard-grass.* Kermadec Islands, North and South Islands: Damp places by roadsides and in waste places, abundant. (South Europe; West Asia to India and China; North and South Africa.)

Polypogon fugax Nees in Steud. Syn. Plant. Gram. 184; Benth. Fl. Austral. 547. North and South Islands: Ditches and salt marshes, not uncommon. (Tropical Asia; Australia.)

Agrostis vulgaris With. Brit. Fl. ed. iii, 2, 132; Hook. f. Student's Fl. 477. *Red-top.* North and South Islands: Pastures and waste places, plentiful. (Europe; North Asia; North America.)

Agrostis alba Linn. Sp. Plant. 63; Hook. f. Student's Fl. 477. *Fiorin.* North and South Islands, Stewart Island: Pastures and waste places, abundant. (Europe; North Asia; North America.)

Gastridium australe Beauv. Agrost. 21; *G. ventricosum* Schinz and Thellung. *Nit-grass.* North Island: Roadsides and waste places, not uncommon. (Europe; West Asia; North Africa.)

Ammophila arundinacea Host Gram. Austr. iv, 24, t. 41; Hook. f. Student's Fl. 481. *Marram-grass.* North and South Islands: Frequently planted for binding the surface of sand-dunes, and increasing in many localities. (Sandy shores of Europe; North Africa.)

Apera Spica-venti Beauv. Agrost. 31; Hook. f. Student's Fl. 480. North and South Islands: Vicinity of Auckland, *T. F. C.;* interior of Otago, *Petrie!* (Europe; North Asia; North Africa.)

Lagurus ovatus Linn. Sp. Plant. 81; Hook. f. Student's Fl. 481; *Harestail-grass.* North and South Islands: Sandy places, often near the sea. (South Europe; West Asia; North Africa.)

Holcus lanatus Linn. Sp. Plant. 1048; Hook. f. Student's Fl. 484. *Yorkshire Fog; Soft-grass.* North and South Islands, Stewart Island, Chatham Islands, Auckland Islands: Abundant throughout. (Europe; North Asia; North Africa.)

Holcus mollis Linn. Syst. ed. x, 1305; Hook. f. Student's Fl. 484. North and South Islands: Noted in several localities, but not common. (Europe; North Asia; North Africa.)

Aira caryophyllea Linn. Sp. Plant. 66; Hook. f. Student's Fl. 482. *Hair-grass.* North and South Islands: Meadows and roadsides, abundant. (Europe; North Asia; North Africa.)

Aira praecox Linn. Sp. Plant. 65; Hook. f. Student's Fl. 482. *Hair-grass.* North and South Islands: Not uncommon. (Europe; West Asia.)

Deschampsia flexuosa Trin. in Bull. Sc. Acad. Petersburg, i (1836) 66; Hook. f. Student's Fl. 483. North and South Islands, Stewart Island: Heathy places, local. (Europe; North and West Asia; North America; Fuegia.)

Avena sativa Linn. Sp. Plant. 79. *Common Oat.* North and South Islands: An abundant escape from cultivation. (Native country uncertain; probably a form of the following species.)

Avena fatua Linn. Sp. Plant. 80; Hook. f. Student's Fl. 484. *Wild Oat.* North and South Islands: Waste places and cultivated fields, abundant. (Europe; North Asia to the Himalayas; North Africa.)

Avena strigosa Schreb. Spic. 52; Hook. f. Student's Fl. 485. *Hairy Oat.* North and South Islands: Cultivated fields, not common. (Europe; North and West Asia.)

Avena pubescens Huds. Fl. Angl. 42; Hook. f. Student's Fl. 485. *Downy Oat.* South Island: Cultivated fields in Canterbury and Otago, not common. (Europe; North Asia.)

Trisetum flavescens Beauv. Agrost. 88; Hook. f. Student's Fl. 484. *Yellow Oat-grass.* North and South Islands: Vicinity of Auckland, *T. F. C.;* Otago, *Petrie!* (Europe; North Asia to the Himalayas; North Africa.)

Arrhenatherum avenaceum Beauv. Agrost. 55, t. 11, f. 5; Hook. f. Student's Fl. 485. *False Oat-grass.* North and South Islands: Fields and waste places, not common. (Europe; North Asia; North Africa.)

Spartina Townsendii H. and J. Groves in Bot. Exch. Club Rep. (1880) 37; Bab. Brit. Bot. 483. North Island: Planted on mud-flats near Foxton, and increasing. (Britain.)

Cynodon Dactylon Pers. Syn. Pl. i, 85; Hook. f. Student's Fl. 486. *Doab-grass.* North and South Islands: Abundant to the north of Cook Strait; less plentiful southwards. (All warm climates and many temperate ones.)

Eleusine indica Gaertn. Fruct. i, 8; Cheesem. Man. N.Z. Fl. 892. North and South Islands: Vicinity of Auckland, *Sinclair* (not seen of late years); near Westport, *W. Townson!* (Most warm countries; probably indigenous in the Kermadec Islands.)

Gynerium argenteum Nees Agrost. Bras. 462. *Pampas-grass.* Has established itself as a garden escape in the vicinity of Auckland, and is spreading in waste places, railway-cuttings, &c. (South America.)

Cynosurus cristatus Linn. Sp. Plant. 72; Hook f. Student's Fl. 488. *Dogstail-grass.* North and South Islands: Fields and meadows, not uncommon. (Europe; West Asia to the Caucasus; North Africa.)

Cynosurus echinatus Linn. Sp. Plant. 72; Hook. f. Student's Fl. 488. North Island: Roadsides at Waihi, *T. F. C.;* vicinity of Gisborne, *Bishop Williams!* (Europe; West Asia; North Africa.)

Triodia decumbens Beauv. Agrost. 76, t. 15, f. 9; *Sieglingia decumbens* Bernk. North Island: Fields and waste places, not uncommon. (Europe; North Africa.)

Eragrostis major Host Gram. Austr. iv, t. 24; *E. megastachya* Link. Hort. Berol. i, 187. North Island: Mangatangi, near Mercer, *S. J. Vining!* (South Europe; tropical Asia.)

Eragrostis minor Host Gram. Austr. iv, 15. North Island: Ballast at Wellington, *T. Kirk.* (South Europe; West Asia to India; North Africa.)

Eragrostis Brownii Nees in Steud. Syn. Glum. i, 279; Benth. Fl. Austral. vii, 646. North Island: Fields and waste places, not uncommon, especially north of Auckland. (Australia.)

Briza maxima Linn. Sp. Plant. 70. *Trembling-grass.* North and South Islands: An occasional garden escape. (South Europe; North Africa.)

Briza media Linn. Sp. Plant. 70; Hook. f. Student's Fl. 491. *Trembling-grass.* South Island: Vicinity of Ashburton, *H. H. Allan!* (Europe; North and West Asia.)

Briza minor Linn. Sp. Plant. 70; Hook. f. Student's Fl. 491. North and South Islands: Not uncommon, particularly in the north. (Europe; North Africa.)

Dactylis glomerata Linn. Sp. Plant. 71; Hook. f. Student's Fl. 490. *Cocksfoot-grass.* North and South Islands, Stewart Island, Auckland and Campbell Islands: Plentiful throughout. (Europe; North and West Asia to India; North Africa.)

Poa annua Linn. Sp. Plant. 68; Hook. f. Student's Fl. 491. *Annual Meadow-grass.* From the Kermadec Islands and the North Cape southwards to the Auckland Islands and Macquarie Island, abundant. (Europe and temperate Asia, but now naturalized in most parts of the world.)

Poa nemoralis Linn. Sp. Plant. 69; Hook. f. Student's Fl. 492. *Wood Meadow-grass.* North and South Islands: Shaded places, not common. (Europe; North Asia to the Himalayas; North America.)

Poa pratensis Linn. Sp. Plant. 67; Hook. f. Student's Fl. 492. *Meadow-grass.* Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands, Auckland Islands: Fields and waste places, abundant. (Europe; North and West Asia to the Himalayas; North America.)

Poa compressa Linn. Sp. Plant. 69; Hook. f. Student's Fl. 69. *Flattened Meadow-grass.* North Island: Fields and waste places, not common. (Europe; North and West Asia.)

Poa trivialis Linn. Sp. Plant. 67; Hook. f. Student's Fl. 492. *Roughish Meadow-grass.* North and South Islands, Auckland Islands, Antipodes Island: Fields and waste places, not uncommon throughout. (Europe; North Asia; North Africa.)

Glyceria aquatica Wahlenb. Fl. Goth. 18; Hook. f. Student's Fl. 494. *Reed-grass.* North and South Islands: Near Foxton, *H. H. Allan;* vicinity of Ashburton, *W. W. Smith;* not uncommon in Otago and Southland, *G. M. Thomson;* Taieri Plains and Catlin's River, *Petrie!* (Europe; North and West Asia; North America.)

Glyceria fluitans R. Br. Prodr. 179; Hook. f. Student's Fl. 494. *Manna-grass.* North and South Islands: Not uncommon in wet places. (Europe; North and West Asia to the Himalayas; North Africa; North America.)

Atropis distans Griseb. in Ledeb. Fl. Ross. iv, 388: *Glyceria distans* Wahlenb.; Hook. f. Student's Fl. 495. North and South Islands: Salt marshes, not uncommon. (Europe; North Asia to the Himalayas; North Africa; North America.)

Festuca elatoir Linn. Sp. Plant. 75 (incl. *F. pratensis* Huds.). *Meadow-fescue.* North and South Islands: Meadows and pastures, not uncommon. (Europe; North and West Asia; North America.)

Festuca ovina Linn. Sp. Plant. 73; Hook. f. Student's Fl. 497. *Sheep's Fescue.* North and South Islands: Abundant in most districts. (Most temperate climates.)

Festuca rubra Linn. Sp. Plant. 74; Hook. f. Student's Fl. 497. North and South Islands: Pastures and waste places, not uncommon. (Most temperate climates.)

Festuca Myurus Linn. Sp. Plant. 74; Hook. f. Student's Fl. 497. *Ratstail-grass.* North and South Islands: Dry places, not uncommon. (Europe; West Asia; North Africa.)

Festuca bromoides Linn. Sp. Plant. 75; Hook. f. Student's Fl. 497. *Brome-like Fescue.* North and South Islands, Chatham Islands: Waste places and pastures, abundant. (Europe; West Asia; North Africa.)

Sclerochloa rigida Beauv. Agrost. 97: *Festuca rigida* Kunth; Hook. f. Student's Fl. 498. North and South Islands: Roadsides and waste places, not common. (Europe; West Asia; North Africa.)

Bromus sterilis Linn. Sp. Plant. 77; Hook. f. Student's Fl. 500. *Barren Brome-grass.* Roadsides and waste places, abundant. (Europe; North Asia; North Africa.)

Bromus erectus Huds. Fl. Angl. ed. i, 39; Hook. f. Student's Fl. 499. *Upright Brome-grass.* North and South Islands: Fields and waste places, not common. (Europe; West Asia; North Africa.)

Bromus madritensis Linn. Cent. Plant. i, 5; Hook. f. Student's Fl. 500. *Compact Brome-grass.* North and South Islands: Apparently not common. (Europe; North Africa.)

Bromus tectorum Linn. Sp. Plant. 77. North Island: Vicinity of Auckland, *T. Kirk.* I have not seen New Zealand specimens. (Europe; North and West Asia; North Africa.)

Bromus mollis Linn. Sp. Plant. ed. ii, 112; Hook. f. Student's Fl. 501. *Soft Brome-grass.* North and South Islands: Fields and waste places, abundant throughout. (Europe; North Asia; North Africa.)

Bromus racemosus Linn. Sp. Plant. ed. ii, 214; Hook. f. Student's Fl. 501. *Smooth Brome-grass.* North and South Islands: Fields and waste places, almost as plentiful as the preceding. (Europe; North Africa.)

Bromus pratensis Schrad. Fl. Germ. i, 352; *B. racemosus* var. *commutatus* Hook. f. Student's Fl. 501. North and South Islands: Fields and waste places, not common. (Europe; North Africa.)

Bromus patulus Mert. and Koch in Roehl. Deutschl. Fl. i, 685. North Island: Not common, in waste places, Auckland and Wellington, *T. Kirk.*

Bromus arvensis Linn. Sp. Plant. 77; Hook. f. Student's Fl. 502. *Field Brome-grass.* North and South Islands: Waste places, not common. (Europe.)

Bromus unioloides H. B. K. Nov. Gen. i, 151: *Ceratochloa unioloides* DC.; Benth. Fl. Austral. vii, 662. *Prairie-grass.* North and South Islands: Fields and waste places, abundant. (North and South America.)

Lolium perenne Linn. Sp. Plant. 83; Hook. f. Student's Fl. 503. *Rye-grass.* Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands, Auckland and Campbell Islands: Pastures and waste places throughout. (Europe; West Asia; North Africa.)

Lolium italicum A. Br. in Flora, xvii (1834) 259. *Italian Rye-grass.* North and South Islands: Fields and pastures, not uncommon. (South Europe; West Asia.)

Lolium temulentum Linn. Sp. Plant. 83; Hook. f. Student's Fl. 503. *Darnel.* North and South Islands: Cultivated fields and waste places, not uncommon. (Europe; North and West Asia; now introduced into most temperate climates.)

Lepturus incurvatus Trin. Fund. Agrost. 123; Benth. Fl. Austral. vii, 668. North Island: Salt marshes, not uncommon. (South Europe; North Africa; West Asia; Australia.)

Agropyrum repens Beauv. Agrost. 102; Hook. f. Student's Fl. 504. *Couch-grass.* North and South Islands: Fields and waste places, not uncommon. (Europe; North Asia to the Himalayas; North Africa; North America.)

Agropyrum pectinatum Beauv. Agrost. 102; Benth. Fl. Austral. vii, 666. North and South Islands: Hawke's Bay, *A. Hamilton!* Central Otago, *Petrie!* (Australia.)

Triticum sativum Lam. Fl. Fr. iii, 625. *Common Wheat.* North and South Islands: An occasional escape from cultivation. (Native country uncertain; now cultivated in most parts of the world.)

Hordeum vulgare Linn. Sp. Plant. 84. *Common Barley.* North and South Islands: An escape from cultivation. (Originally from West Asia; now widely cultivated.)

Hordeum murinum Linn. Sp. Plant. 85; Hook. f. Student's Fl. 506. *Barley-grass.* North and South Islands: Waste places, abundant, especially near the sea. (Europe; West Asia; North Africa.)

Hordeum marinum Huds. Fl. Angl. ed. ii, 57; *H. maritimum* Arr. Brit. Pl. 172. *Sea-barley.* South Island: Akaroa, *T. Kirk!* Canterbury, *J. B. Armstrong.* (Europe; North Africa.)

Elymus arenarius Linn. Sp. Plant. 83; Hook. f. Student's Fl. 507. *Sea Lyme-grass.* North and South Islands: Has been extensively planted on sand-dunes; but apparently spreads very slowly. (Europe; North Asia; North America.)

CYPERACEAE.

Cyperus rotundus Linn. Sp. Plant. 45; Benth. Fl. Austral. vii, 279. *Nut-grass.* North Island: A troublesome weed in several gardens in the vicinity of Auckland. (Most tropical and warm-temperate regions.)

Cyperus lucidus R. Br. Prodr. 218; Benth. Fl. Austral. vii, 283. North and South Islands: Fields and waste places, local. Mangonui, *T. F. C.;* Rangaunu Harbour and Kaitaia, *R. H. Matthews* and *H. Carse!* vicinity of Nelson, *T. F. C.* (Australia.)

Carex divisa Huds. Fl. Angl. i, 348; Hook. f. Student's Fl. 449: *C. chlorantha* T. Kirk in Trans. N.Z. Inst. x, App. xli (not of R. Br.). North Island: Waste places near Auckland, rare. (Europe; North and West Asia to the Himalayas; North and South Africa.)

Carex axillaris Good. in Trans. Linn. Soc. ii (1794) 51; Benth. Ill. Handb. Brit. Fl. t. 1103. North Island: Hobson's Bay, near Auckland, *H. Carse!* (Europe; North Asia; North Africa.)

Carex muricata Linn. Sp. Plant. 974; Hook. f. Student's Fl. 451. South Island: Pelorus Valley, *J. Rutland!* (Europe; North Asia to the Himalayas; North Africa; North America.)

Carex glauca Murr. Prod. Stirp. Gott. 76; *C. flacca* Schreb. Spic. 669. North Island: Fields and waste places, not uncommon. Whangarei, *H. Carse!* vicinity of Auckland, *T. F. C.;* Wellington, *T. Kirk.* (Europe; North Asia to India; North Africa.)

Carex panicea Linn. Sp. Plant. 977; Hook. f. Student's Fl. 457. North Island: Fields and waste places, local. (Europe; North Asia; North America.)

Carex longifolia R. Br. Prodr. 242; Benth. Fl. Austral. vii, 448. North Island: Fields near Auckland, rare, *T. F. C.* (Australia.)

ARACEAE.

Colocasia antiquorum Schott Meletem. i, 18; Benth. Fl. Austral. vii, 155. *Taro.* Formerly cultivated by the Maoris, and still lingering in many deserted plantations. (Native country uncertain; extensively cultivated in the tropics.)

Richardia africana Kunth in Mem. Mus. Par. iv, 433. *White Arum.* North Island: An abundant garden escape in the Auckland Provincial District, in many places spreading spontaneously. Farther south it extends as far as Cook Strait, but is not so plentiful. (South Africa.)

COMMELINACEAE.

Tradescantia fluminensis Vell. Fl. Flum. 140, iii, t. 152. *Wandering-jew.* North Island: Mongonui County, not uncommon in flat swampy forest and by the banks of creeks, *H. Carse!* common in several places near Auckland as a garden escape, *T. F. C.;* spreading fast near Wellington, *B. C. Aston!* (South America; Brazil to Uruquay and Montevideo.)

PONTEDERIACEAE.

Eichhornia crassipes Solms in DC. Monog. Phan. iv, 527. *Water-hyacinth.* North Island: Often planted for ornamental purposes, and is spreading in some localities. Lake Takapuna, *T. F. C.,* entirely filling a small lake near Te Aroha, *F. Neve!* streams near Wellington, *B. C. Aston!* (Tropical America.)

JUNCACEAE.

Juncus Gerardii Lois. in Journ. Bot. ii, 294; Hook. f. Student's Fl. 417. South Island: Recorded by *Petrie* from the vicinity of Dunedin, but has not been seen of late years. (Europe; North and Middle Asia; North Africa; North America.)

Juncus glaucus Ehrh. Calam. 83; Hook. f. Student's Fl. 414. South Island: Between Hokitika and Ross, *T. Kirk.* (Europe; North Asia; North Africa.)

Juncus obtusiflorus Ehrh. Calam. 82; Hook. f. Student's Fl. 417. South Island: Lake Waihola, Otago, *Petrie!* (Europe; North Africa.)

Juncus acutiflorus Ehrh. Calam. 83; Bab. Brit. Bot. ed. x, 427. North Island: Moist gullies at Pukeatua, West Taupo, *Petrie!* (Europe; West Asia.)

LILIACEAE.

Asphodelus fistulosus Linn. Sp. Plant. 309. North and South Islands: Now not uncommon in many localities from Mangonui and Kaitaia southwards to the Bluff, from whence I have specimens collected by *B. C. Aston.* Dr. H. H. Allan reports it as plentiful at Oamaru. (South Europe; West Asia; North Africa.)

Aloe latifolia Haw. Syn. Pl. Succ. 82. North Island: A garden escape in the vicinity of Auckland. Still lingers in the original station in which I observed it in 1882, but has not increased its range. (South Africa.)

Allium vineale Linn. Sp. Plant. 299; Hook. f. Student's Fl. 405. *Crow-garlic.* North Island: Once very common in abandoned Maori cultivations and sandy flats near the sea, but now becoming scarce. (Europe; North Africa.)

Asparagus officinalis Linn. Sp. Plant. 313; Hook. f. Student's Fl. 403. *Asparagus.* North Island: Waste places, not common. Usually solitary plants are seen, doubtless originating from seeds conveyed from gardens by birds. (Europe; North Asia; North Africa.)

AMARYLLIDACEAE.

Agave americana Linn. Sp. Plant. 323; Baker Amaryll. 180. *American Aloe.* North Island: Occasionally seen as a garden escape from Mangonui and the Bay of Islands southwards to Auckland, more rarely to Taranaki and Wellington. Old plants produce a multitude of suckers, and the species thus maintains itself in several localities. (Tropical America.)

IRIDACEAE.

Iris germanica Linn. Sp. Plant. 38; Hook. Bot. Mag. t. 670. *Common Iris.* North Island: A frequent garden escape. (Europe.)

Iris pseud-acorus Linn. Sp. Plant. 38; Hook. f. Student's Fl. 397. *Yellow Flag.* North and South Islands: An occasional garden escape, but local. Mount Egmont Ranges, *S. Percy Smith!* Hutt Valley and vicinity of Nelson, *T. Kirk.* (Europe; West Asia.)

Sisyrinchium chilense Hook. Bot. Mag. t. 2786. North and South Islands: Fields and waste places from Auckland to Otago, local. (South America.)

Sisyrinchium micranthum Cav. Diss. vi, 345, t. 191; Benth. Fl. Austral. vi, 412. North Island: Sandy shores of Spirits Bay, North Cape district, *T. F. C.* (South America.)

Antholyza aethiopica Linn. Syst. ed. x, 863. North Island: A common garden escape in the vicinity of Auckland. (South Africa.)

CANNACEAE.

Canna indica Linn. Sp. Plant. 1. *Indian Shot.* North Island: An occasional garden escape in the vicinity of Auckland. (Now established in all warm climates.)

SALICACEAE.

Salix babylonica Linn. Sp. Plant. 1017; Anderss. in DC. Prodr. xvi, 2, 212. *Weeping-willow.* North Island: Copiously naturalized on the banks of the Northern Wairoa, Waikato, and other streams, doubtless from twigs and branches carried down the rivers by floods from a few planted trees.

Salix fragilis Linn. Sp. Plant. 1017; Hook. f. Student's Fl. 371. *Crack-willow.* North and South Islands: Like the above species, abundantly naturalized on the banks of the larger rivers. (Europe; North and West Asia.)

Salix alba Linn. Sp. Plant. 1021. } Both these species are occasionally seen with the
Salix caprea Linn. Sp. Plant. 1020. } two preceding.

BETULACEAE.

Alnus glutinosa Medic. Pfl. Anat. 393; Hook. f. Student's Fl. 366. *Common Alder.* North Island: Occasionally seen on the banks of the Waikato River between Huntly and the mouth of the river; no doubt originating from seeds or branchlets drifted from the old mission-station at Taupiri. (Europe; North Asia.)

MORACEAE.

Ficus Carica Linn. Sp. Plant. 1059. *Common Fig.* North Island: Often lingers for a considerable time in deserted orchards, but is scarcely naturalized. (South Europe; West Asia, North Africa.)

Humulus Lupulus Linn. Sp. Plant. 1028. *Hop.* North and South Islands: An occasional escape from cultivation as far south as Nelson. (Europe; North Asia; North America.)

URTICACEAE.

Urtica urens Linn. Sp. Plant. 984; Hook. f. Student's Fl. 362. *Small Nettle.* North and South Islands: Waste places, not common. (Europe; North and West Asia; North Africa.)

Urtica dioica Linn. Sp. Plant. 984; Hook. f. Student's Fl. 362. *Common Nettle.* North and South Islands: Roadsides and waste places, not common. (Europe; North and West Asia to India; North Africa.)

PROTEACEAE.

Hakea acicularis R. Br. Prodr. 383; Benth. Fl. Austral. v, 54. North Island: Often planted for hedges in the Auckland District, and frequently spreads. (Australia.)

Hakea saligna Knight Prot. 108. North Island: Vicinity of Waihi, *E. R. Green.* (Queensland; New South Wales.)

POLYGONACEAE.

Polygonum lapathifolium Linn. Sp. Plant. 360; Hook. f. Student's Fl. 344. North and South Islands: Ditches and roadsides, apparently increasing. In immense abundance in the lower part of the Awanui River flats, *H. Carse!* Hauraki Plains, *W. Godfrey!* New Plymouth, *W. W. Smith;* vicinity of Ashburton, *H. H. Allan.* (Europe; North and West Asia to India; North Africa.)

Polygonum Persicaria Linn. Sp. Plant. 361; Hook. f. Student's Fl. 345. North and South Islands: Ditches and roadsides, common in drainage areas. (Europe; North and West Asia; North Africa.)

Polygonum Hydropiper Linn. Sp. Plant. 361; Hook. f. Student's Fl. 345. *Water-pepper.* North and South Islands: Ditches and waste places. Hauraki Plains, *B. C. Aston!* Gisborne, *Bishop Williams!* near Feilding, and river-bed at Ashburton, *H. H. Allan!* (Europe; North and West Asia to India and Java; North America.)

Polygonum Convolvulus Linn. Sp. Plant. 364; Hook. f. Student's Fl. 364. *Black Bindweed.* North and South Islands: Fields and waste places, not uncommon. (Europe; North and West Asia to the Himalayas; North Africa.)

Fagopyrum sagittatum Gilib. Exer. ii, 435; *F. esculentum* Moench Meth. 290. *Buckwheat.* North and South Islands: An occasional escape from cultivation, not common. (North and Central Asia; now cultivated in most parts of the world.)

Rumex obtusifolius Linn. Sp. Plant. 335; Hook. f. Student's Fl. 347. *Common Dock.* North and South Islands, Stewart Island, Chatham Islands: Plentiful throughout. (Europe; North and West Asia; North Africa.)

Rumex pulcher Linn. Sp. Plant. 336; Hook. f. Student's Fl. 348. *Fiddle-dock.* North and South Islands: Fields and waste places, abundant. (Europe; West Asia; North Africa.)

Rumex limosus Thuill. Fl. Par. ed. ii, 182; *R. palustris* Smith Fl. Brit. i, 394. North Island: Near Wellington, *Buchanan.* South Island: Canterbury, *J. B. Armstrong.* (Europe; North Asia.))

Rumex crispus Linn. Sp. Plant. 335; Hook. f. Student's Fl. 349. *Curled Dock.* North and South Islands: Stewart Island, Chatham Islands: Fields and waste places, abundant. (Europe; North Asia; North Africa.)

Rumex sanguineus Linn. Sp. Plant. 334; Hook. f. Student's Fl. 349. North and South Islands, Stewart Island, Chatham Islands: Fields and waste places, abundant throughout. The form with the veins of the leaves green, not red (*R. viridis* Sibthorp) is the one most abundant in New Zealand. (Europe; West Asia.)

Rumex conglomeratus Murr. Prodr. Gotting. 52; Hook. f. Student's Fl. 349. *Clustered Dock.* North and South Islands: Roadsides and waste places, not common. (Europe: West Asia; North Africa.)

Rumex acetosa Linn. Sp. Plant. 337; Hook. f. Student's Fl. 350. *Sorrel.* North and South Islands: Fields and waste places, not uncommon. (Europe; North and West Asia; North Africa.)

Rumex acetosella Linn. Sp. Plant. 338; Hook. f. Student's Fl. 351. *Sheep's Sorrel.* Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands, Auckland Islands: Pastures and cultivated fields; a most abundant and troublesome weed. (Europe; North and West Asia; North Africa; and introduced elsewhere.)

Emex australis Steinh. in Ann. Sci. Nat. Ser. ii, 195; Benth. Fl. Austral. v, 262. *Three cornered Jack.* North and South Islands: Near Auckland and in the Bay of Plenty, *T. F. C.;* vicinity of Wellington, *T. Kirk!* near Parkhurst, Kaipara, *H. P. McLeod!* Westport, *W. Townson!* vicinity of Oamaru, *H. H. Allan!* (Australia.)

NYCTAGINACEAE.

Mirabilis Jalapa Linn. Sp. Plant. 177; Chois. in DC. Prodr. xiii, 2, 429. *Marvel of Peru.* North Island: An occasional garden escape near Auckland. (Tropical America.)

CHENOPODIACEAE.

Beta vulgaris Linn. Sp. Plant. 222. *Common Beet.* North Island: An occasional escape from cultivation. (Europe; North and West Asia.)

Chenopodium album Linn. Sp. Plant. 219; Hook. f. Student's Fl. 336. *Fat-hen; Goosefoot.* North and South Islands: A most abundant weed in cultivated land. (Europe; North and West Asia to India.)

Chenopodium ficifolium Sm. Fl. Brit. i, 276; Hook. f. Student's Fl. 337. North Island: Ballast at Wellington, *T. Kirk.* (Europe.)

Chenopodium murale Linn. Sp. Plant. 219; Hook. f. Student's Fl. 337. *Wall-goosefoot.* North Island: Roadsides and waste places, abundant. (Europe; West Asia to India; North Africa.)

Chenopodium Bonus-Henricus Linn. Sp. Plant. 218; Hook. f. Student's Fl. 338. *Good King Henry.* North and South Islands: An occasional escape from cultivation. Onehunga, *T. F. C.;* Nelson, *R. J. Kingsley!* Christchurch, *J. B. Armstrong.* (Europe; North Asia.)

AMARANTACEAE.

Amarantus caudatus Linn. Sp. Plant. 990; Moq. in DC. Prodr. xiii, 2, 255. Occasionally seen as a garden escape in the vicinity of Auckland, but scarcely naturalized. (Most warm countries.)

Amarantus retroflexus Linn. Sp. Plant. 991; Asa Gray Man. 368. North and South Islands: Waste places and gardens, not uncommon as far south as Timaru. (Tropical America; and naturalized in most warm countries.)

Amarantus Blitum Linn. Sp. Plant. 990; Moq. in DC. Prodr. xiii, 2, 263. North and South Islands: Roadsides and waste places, common as far south as Nelson and Westport. (Most temperate and warm countries.)

Amarantus viridis Linn. Sp. Plant. ed. ii, 1405; Benth. Fl. Austral, v, 215. (Most warm regions.)

AIZOACEAE.

Mesembryanthemum edule Linn. Syst. ed. x, 1060; Harv. and Sond. Fl. Cap. ii, 412. North Island: Often planted to check the advance of drifting sands, and spreading in several localities, especially near New Plymouth. (Cape Colony.)

PHYTOLACCACEAE.

Phytolacca octandra Linn. Sp. Plant. ed. ii, 631; Benth. Fl. Austral. v, 14. *Ink-plant; Pokeweed.* North Island: Roadsides and waste places, abandoned bush clearings, &c.; a common and troublesome weed. (Tropical America.)

PORTULACACEAE.

Portulaca oleracea Linn. Sp. Plant. 445; Benth. Fl. Austral. i, 169. *Purslane.* North Island: Abundant in warm dry soils as far south as the East Cape, rarer from thence to Cook Strait. (All warm climates.)

Claytonia perfoliata Donn. ex Willd. Sp. Plant. 1186; Hook. f. Student's Fl. 70. North and South Islands: A garden escape, but not common. Karori, Wellington, *J. S. Tennant!* Cheviot, *Haast!* near Dunedin, *G. M. Thomson;* Invercargill, *Cockayne.* (North-west America.)

Calandrinia caulescens H. B. K. Nov. Gen. et Sp. vi, 78, t. 526. North and South Islands: Cultivated fields, rare and local. Otahuhu, *T. F. C.;* near Christchurch, *T. Kirk;* near Dunedin, *G. M. Thomson.* (Peru.)

CARYOPHYLLACEAE.

Dianthus Armeria Linn. Sp. Plant. 410; Hook. f. Student's Fl. 53. *Deptford Pink.* North and South Islands: Pastures and waste places, not common. Near Auckland and fields near Hamilton, *T. F. C.;* tussock land in Marlborough and Canterbury, *Cockayne;* near Christchurch, *J. B. Armstrong.* (Europe; West Asia to the Caucasus.)

Dianthus barbatus Linn. Sp. Plant. 409. *Sweet-william.* North and South Islands: A garden escape, not common. (Europe.)

Saponaria Vaccaria Linn. Sp. Plant. 409. North Island: Cultivated fields near Auckland and Wellington, *T. Kirk!* (Europe; West Asia.)

Silene inflata Sm. Fl. Brit. 467: *S. Cucubalus* Wibel; Hook. f. Student's Fl. 55. *Bladder-campion.* North and South Islands: Cultivated fields and roadsides, not uncommon from the Bay of Islands to Otago. (Europe; and northwards to Siberia and southwards to India.)

Silene conica Linn. Sp. Plant. 418; Hook. f. Student's Fl. 55. South Island: Nelson, *H. H. Allan;* Otago, *Petrie!* (Europe; West Asia; Algeria.)

Silene anglica Linn. Sp. Plant. 415: *S. gallica* Linn.; Hook. f. Student's Fl. 55. *Common Catchfly.* North and South Islands, Stewart Island: Fields and waste places, abundant throughout. The variety *quinquevulnera* (often kept as a species) almost as abundant as the type. (Europe; North and West Asia; North Africa.)

Silene noctiflora Linn. Sp. Plant. 410; Hook. f. Student's Fl. 56. North and South Islands: Pastures and waste places, not common. (Europe; Siberia; West Asia.)

Silene nocturna Linn. Sp. Plant. 416. North Island: Karori, near Wellington, *T. Kirk.* (South Europe; West Asia; North Africa.)

Silene nutans Linn. Sp. Plant. 417; Hook. f. Student's Fl. 56. *Nodding Catchfly.* North and South Islands: Pastures and waste places. Matamata, Thames Valley, *T. F. C.;* near Christchurch, *J. B. Armstrong.* (Europe; North and West Asia; Canary Islands.)

Lychnis Flos-Cuculi Linn. Sp. Plant. 436; Hook. f. Student's Fl. 57. *Ragged Robin.* North and South Islands: Pastures, not common. Whangarei, *T. F. C.;* vicinity of Auckland, *T. Kirk!* Ashburton, *W. W. Smith.* (North Europe; Siberia.)

Lychnis dioica Linn. Sp. Plant. 436: *L. vespertina* Sibth.; Hook. f. Student's Fl. 57. *White Campion.* North and South Islands: Fields and roadsides, not common. Tauranga, *T. F. C.;* Ashburton, *W. W. Smith, H. H. Allan;* near Dunedin, *G. M. Thomson.* (Europe; West Asia; North Africa.)

Lychnis Coronaria Desr. in Lam. Encycl. iii, 643. *Rose-campion.* North and South Islands: An occasional outcast from gardens. (South Europe; Asia Minor and eastwards to the Himalayas.)

Lychnis Githago Scop. Fl. Carn. i, 310: *Githago segetum* Desf.; Hook. f. Student's Fl. 58. *Corn-cockle.* North and South Islands: Cultivated fields, not uncommon. (Europe; Siberia.)

Cerastium viscosum Linn. Sp. Plant. 437: *C. glomeratum* Thuill.; Hook. f. Student's Fl. 59. *Mouse-ear.* Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Abundant throughout. (Europe; North and West Asia; North Africa.)

Cerastium vulgatum Linn. Fl. Suec. ii, 158: *C. triviale* Link.; Hook. f. Student's Fl. 60. *Larger Mouse-ear.* Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands, Auckland Islands, Macquarie Island: Abundant throughout. (Distribution of the preceding.)

Stellaria media Cyr. Char. Comm. 36; Hook. f. Student's Fl. 62. *Common Chickweed.* Kermadec Islands southwards to Macquarie Island; a most abundant weed. (Originally from North Europe and Asia, now found in all temperate and cold climates.)

Stellaria Holostea Linn. Sp. Plant. 422; Hook. f. Student's Fl. 62. *Stitchwort.* South Island: Canterbury Provincial District, *J. F. Armstrong;* near Ashburton, *W. W. Smith.* (Europe; West Asia.)

Stellaria graminea Linn. Sp. Plant. 422; Hook. f. Student's Fl. 62. *Lesser Stitchwort.* North and South Islands: Fields and roadsides, abundant in most districts. (Europe; North and West Asia.)

Stellaria uliginosa Murr. Prodr. Stirp. Gotting. 55; Hook. f. Student's Fl. 63. *Bog-starwort.* South Island: Bogs near Westport, *W. Townson!* Ruapuke Island (in Foveaux Strait), *C. Traill.* (North Europe; North and West Asia; North Africa; North America.)

Arenaria serpyllifolia Linn. Sp. Plant. 423; Hook. f. Student's Fl. 64. *Sandwort.* North and South Islands: Not uncommon in light dry soils. (Europe; West Asia to the Himalayas.)

Sagina procumbens Linn. Sp. Plant 128; Hook. f. Student's Fl. 66. *Pearlwort.* North and South Islands, Stewart Island: A common weed on damp ground. (Europe; North and West Asia to the Himalayas; North Africa; temperate North and South America.)

Sagina apetala Linn. Mant. ii, 559; Hook. f. Student's Fl. 66. *Pearlwort.* North and South Islands, Chatham Islands: Abundant throughout. (Europe; North and West Asia; North Africa.)

Spergula arvensis Linn. Sp. Plant. 440; Hook. f. Student's Fl. 67. *Spurrey.* North and South Islands, Stewart Island: An abundant weed throughout. (Europe; West Asia to India; North Africa.)

Spergularia rubra J. and C. Presl Fl. Cech. 94; Hook. f. Student's Fl. 68. *Sand-spurrey.* North and South Islands: Roadsides and waste places, abundant on dry soils. (Most temperate countries.)

Polycarpon tetraphyllum Linn. Syst. 881; Hook. f. Student's Fl. 69. Kermadec Islands, North and South Islands, Stewart Island: Roadsides and waste places, abundant on dry soils. (Europe; West Asia; North Africa.)

Herniaria hirsuta Linn. Sp. Plant. 218; Hook. f. Student's Fl. 334. *Rupture-wort.* North Island: Sandy flats north of the Manukau Heads, *T. F. C.* (Europe; West Asia to India.)

Ranunculaceae.

Ranunculus aquatilis Linn. Sp. Plant. 556; Benth. Ill. Handb. Brit. Fl. i, 11. *Water-buttercup.* North and South Islands: Rivers and lakes from the Waikato River southwards, increasing rapidly. (Europe; North Asia; North America.)

Ranunculus Lingua Linn. Sp. Plant. 549; Hook. f. Student's Fl. 8. *Great Spearwort.* South Island: Naturalized in water-races near Ashburton, *H. H. Allan.* (Europe; North and West Asia to the Himalayas.)

Ranunculus flammula Linn. Sp. Plant. 548; Hook. f. Student's Fl. 8. *Lesser Spearwort.* North and South Islands: Vicinity of Kaitaia, *H. B. Matthews!* Waiharakeke Stream, Piako, *J. H. Allen!* South Canterbury, *A. V. Macdonald!* (Europe; North America.)

Ranunculus sceleratus Linn. Sp. Plant. 551; Hook. f. Student's Fl. 8. *Celery-leaved Buttercup.* North and South Islands: Damp pastures and waste places from Mangonui to Southland, not uncommon. (Europe; North and Central Asia.)

Ranunculus acris Linn. Sp. Plant. 554; Hook. f. Student's Fl. 9. *Field-buttercup.* North and South Islands, Stewart Island: Pastures and waste places throughout, apparently more plentiful in the South. (Europe; North Asia.)

Ranunculus repens Linn. Sp. Plant. 554; Hook. f. Student's Fl. 9. *Creeping Buttercup.* North and South Islands, Stewart Island: Pastures and waste places, abundant throughout. (Europe; North Asia; North America.)

Ranunculus bulbosus Linn. Sp. Plant. 554; Hook. f. Student's Fl. 9. *Bulbous Buttercup.* North and South Islands: Not uncommon in pastures, but more plentiful in the North than in the South. (Europe; West Asia; North Africa.)

Ranunculus sardous Crantz Stirp. Austr. 84: *R. hirsutus* Curt.; Hook. f. Student's Fl. 10. *Hairy Buttercup.* Pastures and waste places, common in the North Island, less abundant in the South. (Europe; West Asia; North America.)

Ranunculus parviflorus Linn. Syst. Nat. 1087; Hook. f. Student's Fl. 10. *Small-flowered Buttercup.* North and South Islands: Pastures and waste places; common in the North, less so southwards. (Europe; West Asia; North Africa.)

Ranunculus arvensis Linn. Sp. Plant. 555; Hook. f. Student's Fl. 10. *Corn-buttercup.* Cultivated fields, not common. (Central and South Europe; West Asia.)

Ranunculus muricatus Linn. Sp. Plant. 555; Hook. f. Fl. Brit. Ind. i, 20. North and South Islands: Waste places, local. (Europe; West Asia; North America.)

Ranunculus (*Ceratocephalus*) *falcatus* Linn. Sp. Plant. 556; Hook. f. Fl. Brit. Ind. i, 16. Dry localities in North and Central Otago, *Petrie!* (South Europe; West Asia.)

Nigella damascena Linn. Sp. Plant. 584. *Fennel-flower; Love-in-a-mist.* North Island: A garden escape in the vicinity of Auckland, not common. (South Europe.)

Aquilegia vulgaris Linn. Sp. Plant. 533; Hook. f. Student's Fl. 13. *Columbine.* North and South Islands: An occasional garden escape. (Temperate Europe and Asia.)

Berberidaceae.

Berberis vulgaris Linn. Sp. Plant. 330; Hook. f. Student's Fl. 14. *Common Barberry.* North and South Islands: Occasionally seen as an escape from planted hedges. (Europe; West Asia; North Africa.)

Papaveraceae.

Papaver hybridum Linn. Sp. Plant. 506; Hook. f. Student's Fl. 17. *Rough Poppy.* South Island: Cultivated fields near Ashburton, *W. W. Smith; H. H. Allan!* (Europe; West Asia; North Africa.)

Papaver dubium Linn. Sp. Plant. 1196; Hook. f. Student's Fl. 17. *Long-headed Poppy.* South Island: Cultivated fields near Ashburton, *H. H. Allan;* cultivated fields in Otago, *Petrie!* (Europe; North Asia; North-west India.)

Papaver Rhoeas Linn. Sp. Plant. 507; Hook. f. Student's Fl. 17. *Field-poppy.* North and South Islands: Cornfields and waste places, not common. (Europe; West Asia; North Africa.)

Papaver Argemone Linn. Sp. Plant. 506; Hook. f. Student's Fl. 17. *Pale Poppy.* South Island: Pastures, not common. Near Ashburton, *W. W. Smith;* Southland, *G. M. Thomson.* (Europe; North Africa.)

Papaver somniferum Linn. Sp. Plant. 508; Hook. f. Student's Fl. 18. *Opium-poppy.* North and South Islands: An occasional garden escape, rare. (Commonly cultivated in warm temperate climates.)

Glaucium flavum Crantz Stirp. Austr. ii, 131: *G. luteum* Scop.; Hook. f. Student's Fl. 19. *Horned Poppy.* North and South Islands: Sandy or shingly beaches from Wanganui and Hawke's Bay to Wellington. Near the mouth of the Awatere River, *Cockayne;* vicinity of Ashburton, *W. W. Smith;* Puketeraki (Otago), *G. M. Thomson.* (Europe; West Asia; North Africa.)

Chelidonium majus Linn. Sp. Plant. 505; Hook. f. Student's Fl. 18. *Celadine.* South Island: An occasional garden escape. Ashburton, *W. W. Smith;* vicinity of Dunedin, *G. M. Thomson.* (Europe; Asia Minor to Persia.)

Eschscholtzia californica Cham. in Hort. Phys. Berol. 74; Wats. Bot. Calif. i, 22. North and South Islands: A garden escape in light dry soils, not uncommon. (California.)

Fumaria muralis Sond. ex Koch Syn. Fl. Germ. 1017. *Common Fumitory.* Kermadec Islands, North and South Islands: Cultivated fields and waste places; an abundant weed. (Europe; West Asia; North Africa.)

Fumaria officinalis Linn. Sp. Plant. 700; Hook. f. Student's Fl. 20. *Fumitory.* North and South Islands: Cultivated fields, rare. (Europe; West Asia; North Africa.)

Cruciferae.

Matthiola incana R. Br. in Ait. Hort. Kew, iv, 119; Hook. f. Student's Fl. 24. *Common Stock.* North Island: Cliffs at Castle Point, Wellington, *T. Kirk!* (West Europe; all round the Mediterranean.)

Cheiranthus Cheiri Linn. Sp. Plant. 661; Hook. f. Student's Fl. 24. *Wallflower.* North and South Islands: A garden escape in several localities, but not common. (Central and North Europe.)

Nasturtium officinale R. Br. in Ait. Hort. Kew, iv, 111; Hook. f. Student's Fl. 24. *Common Watercress.* North and South Islands, Stewart Island: Abundant in streams and wet places from the North Cape southwards. (Europe; West Asia; North Africa.)

Barbarea verna Aschers. Fl. Prov. Brandenb. i, 36: *B. praecox* R. Br. in Ait. Hort. Kew, iv, 111; Hook. f. Student's Fl. 26. *American Cress.* North and South Islands: Waste places and roadsides, not uncommon. (Europe; plentifully introduced in North America.)

Alyssum calycinum Linn. Sp. Plant. 908; Hook. f. Student's Fl. 36. *Small Alyssum.* North and South Islands: Roadsides and waste places, not uncommon, ascending to 3000 ft. in Central Otago, *Petrie!* (Central and South Europe; West Asia.)

Alyssum maritimum Lam. Encycl. i, 98; Hook. f. Student's Fl. 36. *Sweet Alyssum.* North and South Islands: Waste places and dry sandy soil near the sea, often abundant. (Europe.)

Erophila vulgaris DC. Syst. ii, 356; Hook. f. Student's Fl. 35. *Whitlow-grass.* South Island: Eastern and Central Otago, *Petrie!* (Central and South Europe.)

Cochlearia Armoracia Linn. Sp. Plant. 648; Hook. f. Student's Fl. 37. *Horse-radish.* North and South Islands: Deserted gardens and waste places, not common. (Europe.)

Hesperis matronalis Linn. Sp. Plant. 663; Hook. f. Student's Fl. 31. *Dame's Rocket.* North and South Islands: A garden escape. Poverty Bay, *Bishop Williams;* near Wellington, *T. Kirk!* near Oamaru, *Petrie!* (Europe; West Asia.)

Malcolmia maritima R. Br. in Ait. Hort. Kew, iv, 121. *Virginian Cress.* North and South Islands: An occasional garden escape, but not common. (South Europe.)

Sisymbrium Sophia Linn. Sp. Plant. 639; Hook. f. Student's Fl. 29. *Flixweed.* South Island: Central Otago, *Petrie!* (North Europe; North and Central Asia; North Africa; North and South America.)

Sisymbrium officinale Scop. Fl. Carn. 26; Hook. f. Student's Fl. 30. *Hedge-mustard.* North and South Islands: Roadsides and waste places, plentiful. (Europe; North Asia.)

Camelina sativa Crantz Stirp. Austr. i, 18; Hook. f. Student's Fl. 37. *Gold of Pleasure.* North and South Islands: Cultivated fields, rare. Remuera, *T. F. C.;* Oamaru, *Petrie!* (Europe; West Asia.)

Brassica oleracea Linn. Sp. Plant. 667; Hook. f. Student's Fl. 31. *Wild Cabbage.* Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands, Auckland Islands: Originally an escape from cultivation, now common on sea-cliffs in several localities, especially near abandoned Maori cultivations. (Coasts of South and West Europe.)

Brassica campestris Linn. Sp. Plant. 666; Hook. f. Student's Fl. 32. *Swede.* North and South Islands: Not uncommon in cultivated fields. (Europe.)

Brassica Rapa Linn. Sp. Plant. 666; *B. campestris* var. *Rapa* Hook. f. Student's Fl. 32. *Turnip.* North and South Islands: Cultivated fields, not uncommon. (Europe.)

Brassica Napus Linn. Sp. Plant. 666; *B. campestris* var. *oleifera* Hook. f. Student's Fl. 32. *Rape.* North and South Islands: Abundant in cultivated fields. (Europe.)

Sinapis nigra Linn. Sp. Plant. 668; Bab. Brit. Bot. 32. *Black Mustard.* North and South Islands: Cultivated fields and waste places, not uncommon. (Europe; North and West Asia.)

Sinapis adpressa Schloss. and Vukot. Fl. Croat. 237; Bab. Brit. Bot. 33. North and South Islands: Fields and waste places, not uncommon. (Europe; North and West Asia.)

Sinapis arvensis Linn. Sp. Plant. 668: *Brassica Sinapistrum* Boiss. Voy. Espagne, ii, 39; Hook. f. Student's Fl. *Charlock.* North and South Islands: Cultivated fields and waste places, not uncommon. (Europe; North and West Asia; North Africa.)

Sinapis alba Linn. Sp. Plant. 668: *Brassica alba* Boiss; Hook. f. Student's Fl. 33. *White Mustard.* North and South Islands: Cultivated fields and waste places, not common. (Europe; North and West Asia; North Africa.)

Diplotaxis muralis DC. Syst. ii, 634; Hook. f. Student's Fl. 33. *Wall-mustard.* North and South Islands: Waste places, not uncommon. (Europe; North Africa.)

Eruca sativa Lam. Fl. Fr. ii, 496. North Island: Port Fitzroy (Great Barrier Island), *T. Kirk!* (South Europe; West Asia.)

Capsella Bursa-pastoris Medic. Pflanzeng. 85; Hook. f. Student's Fl. 38. *Shepherd's Purse.* North and South Islands, Stewart Island: Abundant throughout. (Europe; North and West Asia; North Africa.)

Coronopus didymus Sm. Fl. Brit. ii, 691: *Senebiera didyma* Pers. Syn. ii, 185; Hook. f. Student's Fl. 39. *Wart-cress.* Kermadec Islands, North and South Islands, Stewart Island: An abundant weed in waste places, especially near the sea. (Originally from South America; now spread over the whole world.)

Coronopus procumbens Gilib Fl. Lituan. ii, 52: *Senebiera Coronopus* Poir. Encycl. vii, 76; Hook. f. Student's Fl. 39. *Wart-cress.* North and South Islands: Waste places, but not so plentiful as the preceding. (A cosmopolitan weed.)

Lepidium Draba Linn. Sp. Plant. 645; Hook. f. Student's Fl. 40. *Hoary Cress.* South Island: Cultivated fields and roadsides. Vicinity of Christchurch, *J. B. Armstrong;* Ashburton, *W. W. Smith, H. H. Allan;* Morven Hills, Otago, *G. M. Thomson.* (South Europe; West Asia.)

Lepidium campestre R. Br. in Ait. Hort. Kew, iv, 88; Hook. f. Student's Fl. 40. *Field-cress; Pepper-wort.* North and South Islands: Cultivated fields and waste places, not common. (Europe; West Asia; North Africa.)

Lepidium hirtum Sm. Fl. Brit. 98; *L. Smithii* Hook. f. Student's Fl. 40. North and South Islands: Cultivated fields, local. (Europe.)

Lepidium ruderale Linn. Sp. Plant. 645; Hook. f. Student's Fl. 39. *Wayside-cress.* Kermadec Islands, North and South Islands: Waste places and roadsides, common, especially near the sea. (Europe; North and West Asia.)

Lepidium sativum Linn. Sp. Plant. 644; Bab. Brit. Bot. 38. *Garden-cress.* North and South Islands: An occasional escape from cultivation, not common. (Europe; not known in an indigenous state.)

Thlaspi arvense Linn. Sp. Plant. 641; Hook. f. Student's Fl. 40. *Penny-cress.* South Island: Pastures and waste places, not common. (Europe; North-west Asia to India; North Africa.)

Iberis amara Linn. Sp. Plant. 649; Hook. f. Student's Fl. 41. *Candytuft.* North and South Islands: A garden escape, but far from common. (Western Europe.)

Rapistrum rugosum All. Fl. Pedem. i, 257. North Island: Once very plentiful in waste places within the confines of the City of Auckland, now very nearly extinct. (South Europe; West Asia.)

Cakile maritima Scop. Fl. Carn. ii, 35; Hook. f. Student's Fl. 43. *Sea-rocket.* South Island: Sandy or shingly shores, not common. Near New Brighton, Christchurch, *Cockayne.* (Europe; North Africa.)

Raphanus sativus Linn. Sp. Plant. 669. *Common Radish.* North and South Islands: A garden escape, not uncommon, especially on the coast. (Europe; now naturalized in many countries.)

RESEDACEAE.

Reseda Luteola Linn. Sp. Plant. 448; Hook. f. Student's Fl. 45. *Dyer's Weed.* North and South Islands: Fields and waste places, from the Bay of Islands southwards to Central Otago, not uncommon. (Europe; West Asia; North Africa.)

Reseda lutea Linn. Sp. Plant. 449; Hook. f. Student's Fl. 45. *Cut-leaved Mignonette.* North and South Islands: Pukekaroro, *J. P. D. Morgan!* slopes of Mount Eden, Auckland, *F. Neve!* vicinity of Ashburton, *H. H. Allan!* (Europe; West Asia; North Africa.)

Reseda alba Linn. Sp. Plant. 449; Hook. f. Student's Fl. 45. *White Mignonette.* North and South Islands: Not uncommon. Poverty Bay, *Bishop Williams!* Canterbury, *T. Kirk;* vicinity of Ashburton, *H. H. Allan;* Otago, *G. M. Thomson.* (Europe; West Asia; North Africa.)

CRASSULACEAE.

Tillaea trichotoma Walp. Rep. ii, 251; Harv. and Sond. Fl. Cap. ii, 330. North Island: Roadsides and waste places, not uncommon. Kaitaia, *H. B. Matthews!* vicinity of Auckland, *T. F. C.;* Wanganui, *E. W. Andrews!* (South Africa.)

Sedum acre Linn. Sp. Plant. 432; Hook. f. Student's Fl. 148. *Stonecrop.* North and South Islands: Dry places, apparently increasing. Rangitoto Island, *T. F. C.;* stony river-beds on the Canterbury Plains, *Cockayne;* vicinity of Ashburton, *W. W Smith.* (Europe; North and West Asia; North Africa.)

SAXIFRAGACEAE.

Ribes Grossularia Linn. Sp. Plant. 201; Hook. f. Student's Fl. 144. *Gooseberry.* A garden escape of frequent occurrence, especially in the South Island. (Europe; North and West Asia; Himalayas; North Africa.)

ROSACEAE.

Prunus persica Stokes Bot. Mat. Med. iii, 100; *Amygdalus persica* Linn. Sp. Plant. 472. *Peach.* North Island: Copiously naturalized in the Auckland Provincial District in the early period of settlement, but at the present time rarely spreads out of cultivation. (Originally from China or Central Asia.)

Prunus Cerasus Linn. Sp. Plant. 474; Hook. f. Student's Fl. 115. *Common Cherry.* North and South Islands: Maintains itself in old Maori plantations and deserted orchards, sometimes forming small groves. (South Europe; West Asia.)

Prunus avium Linn. Fl. Suec. ii, 474; Hook. f. Student's Fl. 115. *Gean Cherry.* South Island: An occasional garden escape, not common. (Europe; West Asia to the Himalayas.)

Rubus idaeus Linn. Sp. Plant. 492; Hook. f. Student's Fl. 117. *Raspberry.* North and South Islands: An occasional escape from cultivation, not common. (Europe; North and West Asia; North Africa.)

Rubus fruticosus Linn. Sp. Plant. 494, in a wide sense; Hook. f. Student's Fl. 117. *Bramble; Blackberry.* North and South Islands, Stewart Island, Chatham Islands: Copiously naturalized throughout, and probably the most troublesome weed in New Zealand. Several of the subspecies or varieties have been introduced; the most prominent being *R. discolor* Weihe and Nees; *R. leucostachys* Smith; *R. rusticanus* Weihe; *R. macrophyllus* Weihe; and *R. laciniatus* Willd. (Europe; North and West Asia to the Himalayas; North Africa.)

Fragaria vesca Linn. Sp. Plant. 494; Hook. f. Student's Fl. 123. *Wild Strawberry.* North and South Islands: An occasional garden escape, but not common. (Europe; West Asia; North America.)

Fragaria elatior Ehr. Beitr. vii, 23; Hook. f. Student's Fl. 123. *Hautbois Strawberry.* North and South Islands: An occasional garden escape, but much rarer than the preceding. (Europe; West Asia.)

Potentilla reptans Linn. Sp. Plant. 499; Hook. f. Student's Fl. 125. *Cinquefoil.* North and South Islands: Roadsides and pastures, local. Near Hamilton, *T. F. C.;* Wellington, *T. Kirk!* Canterbury, *J. B. Armstrong, H. H. Allan.* (Europe; North and West Asia to the Himalayas; Canary Islands and the Azores.)

Alchemilla arvensis Scop. Fl. Carn. i, 115; Hook. f. Student's Fl. 127. *Parsley-piert.* North and South Islands: Waste places and fields, often abundant in light dry soils. (Europe; West Asia; North Africa.)

Acaena ovina A. Cunn. in Field's N.S. Wales, 358; Benth. Fl. Austral. ii, 433. North and South Islands: Fields and waste places from the East Cape southwards, not uncommon. (Australia.)

Poterium Sanguisorba Linn. Sp. Plant. 994; Hook. f. Student's Fl. 128. *Salad-burnet.* North and South Islands: Roadsides and pastures, not uncommon on dry soils. (Europe; North and West Asia to India; North Africa.)

Poterium polygamum Waldst. and Kit. Plant. Rar. Hung. ii, 217, t. 198: *P. muricatum* Spach; Hook. f. Student's Fl. 129. *Burnet.* South Island: Near Lake Ellesmere and elsewhere on the Canterbury Plains, *T. Kirk!* (South Europe.)

Sanguisorba officinalis Linn. Sp. Plant. 116; *Poterium officinale* Hook. f. Student's Fl. 129. *Great Burnet.* North and South Islands, local. Kawau Island, *Buchanan;* sand-dunes at North Otago Heads, *G. M. Thomson.* (North Europe; North and West Asia.)

Rosa rubiginosa Linn. Mant. ii, 564; Hook. f. Student's Fl. 131. *Sweetbrier.* North and South Islands: Abundant throughout; a very serious and troublesome weed. (Europe; North and West Asia to the Himalayas.)

Rosa canina Linn. Sp. Plant. 492; Hook. f. Student's Fl. 132. *Dog-rose.* North and South Islands: Roadsides and waste places, not uncommon. (Europe; North Asia; North Africa.)

Rosa multiflora Thunb. Fl. Jap. 214. North Island: Often lingering for years in deserted gardens, &c., but scarcely naturalized. (China; Japan.)

Crataegus oxyacantha Linn. Sp. Plant. 477; Hook. f. Student's Fl. 137. *Hawthorn.* North and South Islands: Scarcely naturalized, but young plants sometimes appear in the vicinity of planted hedges. (Europe; North and West Asia; North Africa.)

Leguminosae.

Lupinus arboreus Sims Bot. Mag. t. 682; Watson Bot. Calif. i, 117. *Tree-lupin.* North and South Islands: Often planted to arrest drifting sands, and spreading in several localities. Is also firmly established in many stony river-beds of the eastern side of the South Island. (California.)

Ulex europaeus Linn. Sp. Plant. 241; Hook. f. Student's Fl. 92. *Gorse; Furze.* North and South Islands, Chatham Islands, Stewart Island, Auckland Islands: Abundant throughout; in many districts a troublesome weed. (Europe; Canary Islands and the Azores.)

Cytisus scoparius Link. Enum. Hort. Berol. ii, 241; Hook. f. Student's Fl. 92. *Broom.* North and South Islands, Stewart Island: Plentiful in most districts, and in immense abundance in many of the stony river-beds of the South Island. (Europe; North Asia; North Africa.)

Cytisus albus Link. Enum. Hort. Berol. ii, 241; DC. Prodr. ii, 153. *White Broom.* North and South Islands: An occasional garden escape, but well established and spreading in some localities. (South Europe.)

Cytisus candicans Lam. Fl. Fr. ii, 623. North and South Islands: Waste places and stony river-beds, not common. (South Europe; North Africa.)

Medicago sativa Linn. Sp. Plant. 778; Hook. f. Student's Fl. 95. *Lucerne; Alfalfa.* Cultivated fields and waste places; scarcely naturalized. (South Europe.)

Medicago lupulina Linn. Sp. Plant. 778; Hook. f. Student's Fl. 95. *Black Medick.* North and South Islands: Fields and waste places, abundant throughout. (Europe; North and West Asia to India; North Africa.)

Medicago hispida Gaertn. Fruct. ii, 349: *M. denticulata* Willd. Sp. Plant. iii, 1414; Hook. f. Student's Fl. 95. *Toothed Medick.* North and South Islands, Chatham Islands, Stewart Island: Cultivated fields and pastures, abundant throughout. (Europe; North and West Asia to India; North Africa.)

Medicago arabica Medic. in Vorles. Churpf. Phys. Ges. ii, 386: *M. maculata* Willd. Sp. Plant. iii, 1412; Hook. f. Student's Fl. 95. *Spotted Medick.* North and South Islands: Pastures and waste places, abundant throughout. (Europe; West Asia; North Africa.)

Melilotus officinalis Lam. Fl. Fr. ii, 594; Benth. Ill. Handb. Brit. Fl. i, 193. *Field-melilot.* North and South Islands: Sparingly naturalized in fields and waste places. (Europe; North and West Asia to India; North Africa.)

Melilotus arvensis Wallr. Sched. Crit. 391; Benth. Ill. Handb. i, 194. *Field-melilot.* North and South Islands, Chatham Islands: Roadsides and waste places; plentiful, especially in sandy places near the sea. (Europe; North and West Asia; North Africa.)

Melilotus alba Desf. in Lam. Encycl. iv, 63; Hook. f. Student's Fl. 96. *White Melilot.* North and South Islands: Waste places, apparently rare. Napier, *T. Kirk; T. F. C.;* Canterbury Plains, *T. Kirk, J. B. Armstrong;* Ashburton, *W. W. Smith, H. H. Allan.* (Europe; North and West Asia to India.)

Trifolium subterraneum Linn. Sp. Plant. 767; Hook. f. Student's Fl. 97. *Subterranean Clover.* North and South Islands: Common in the northern portion of the North Island, less plentiful south of the East Cape. Near Ashburton, *H. H. Allan.* (South Europe; West Asia to India; North Africa.)

Trifolium arvense Linn. Sp. Plant. 769; Hook. f. Student's Fl. 97. *Haresfoot-clover.* North and South Islands: Roadsides and waste places; common, especially in light dry soils. (Europe; North and West Asia; North Africa.)

Trifolium incarnatum Linn. Sp. Plant. 769; Hook. f. Student's Fl. 97. *Crimson Clover.* North and South Islands: Pastures, not common. (South and West Europe.)

Trifolium ochroleucum Huds. Fl. Angl. 283; Hook. f. Student's Fl. 98. *Sulphur-clover.* South Island: Reported many years ago from Canterbury, but has not been observed of late years. (West and South Europe; West Asia.)

Trifolium pratense Linn. Sp. Plant. 768; Hook. f. Student's Fl. 98. *Red Clover.* Kermadec Islands, North and South Islands, Chatham Islands, Stewart Island: Abundant throughout. (Europe; North and West Asia to India; North Africa.)

Trifolium medium Linn. Fann. Suec. ed. ii, 558; Hook. f. Student's Fl. 98. *Meadow-clover; Zigzag Clover.* North and South Islands: Pastures and meadows, not uncommon. (Europe; North and West Asia.)

Trifolium scabrum Linn. Sp. Plant. 770; Hook. f. Student's Fl. 99. *Rough Clover.* North Island: Pastures and waste places, not common. (Europe; West Asia; North Africa.)

Trifolium striatum Linn. Sp. Plant. 770; Hook. f. Student's Fl. 99. *Knotted Clover.* North and South Islands: Whangarei, *H. L. Squires!* roadsides near Ashburton, *H. H. Allan.* (Europe; Asia Minor; North Africa.)

Trifolium glomeratum Linn. Sp. Plant. 770; Hook. f. Student's Fl. 99. *Clustered Clover.* North and South Islands: Pastures and waste places, abundant. (Europe; West Asia; North Africa.)

Trifolium hybridum Linn. Sp. Plant. 766; Hook. f. Student's Fl. 99. *Alsike-clover.* North and South Islands: Pastures and meadows, not uncommon. (Europe; West Asia; North Africa.)

Trifolium repens Linn. Sp. Plant. 772; Hook. f. Student's Fl. 100. *White Clover.* Kermadec Islands, North and South Islands, Chatham Islands, Stewart Island, Auckland and Campbell Islands: Abundant throughout. (Europe; North and West Asia to India; North Africa.)

Trifolium fragiferum Linn. Sp. Plant. 771; Hook. f. Student's Fl. 100. *Strawberry-clover.* North Island: Fields and waste places, not uncommon. (Europe; North and West Asia; North Africa.)

Trifolium resupinatum Linn. Sp. Plant. 771; Benth. Ill. Handb. i, 205. *Reversed Clover,* North Island: Fields and waste places, plentiful in the North Cape district and increasing elsewhere. (Europe; West Asia to the Caucasus.)

Trifolium procumbens Linn. Sp. Plant. 772; Hook. f. Student's Fl. 101. *Hop-trefoil.* Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Abundant throughout. (Europe; North and West Asia; North Africa.)

Trifolium dubium Sibth. Fl. Oxon. 231; Hook. Student's Fl. 101. *Yellow Suckling.* North and South Island, Stewart Island, Chatham Islands: Plentiful throughout. (Europe; North Africa.)

Trifolium filiforme Linn. Sp. Plant. 773; Hook. f. Student's Fl. 101. *Lesser Trefoil.* South Island: Various localities in Otago and Southland, not common. (Europe; West Asia to the Caucasus.)

Anthyllis Vulneraria Linn. Sp. Plant. 719; Hook. f. Student's Fl. 102. *Kidney-vetch.* South Island: Sparingly naturalized near Nelson and Dunedin, *T. Kirk;* Southland, *G. M. Thomson.* (Europe; West Asia; North Africa.)

Lotus corniculatus Linn. Sp. Plant. 775; Hook. f. Student's Fl. 102. *Birdsfoot-trefoil.* North and South Islands: Fields and roadsides, plentiful. (Europe; North and West Asia to India; North Africa.)

Lotus major Scop. Fl. Carn. ed. ii, 86; Bab. Brit. Bot. ed. viii, 96. *Greater Birdsfoot-trefoil.* North and South Islands: Fields and waste places, abundant. (Europe; North Africa.)

Lotus angustissimus Linn. Sp. Plant. 774; Bab. Brit. Bot. ed. viii, 96. *Slender Birdsfoot trefoil.* North Island: Not uncommon. (Europe; West Asia.)

Lotus hispidus Desf. Tabl. i, 140; Bab. Brit. Bot. ed. viii, 96. *Hispid Birdsfoot-trefoil.* North and South Islands: Not uncommon. (Europe; West Asia; North Africa.)

Psoralea pinnata Linn. Sp. Plant. 762; Harv. and Sond. Fl. Cap. iii, 144. North Island: Originally a garden escape, now becoming a pest in several parts of the Auckland Provincial District. (South Africa.)

Galega officinalis Linn. Sp. Plant. 714; DC. Prodr. ii, 248. *Goat's-rue.* North Island: Valley of the Manawatu, originally noticed by *H. J. Matthews*, now a troublesome weed. (South Europe; West Asia; North Africa.)

Robinia Pseud-acacia Linn. Sp. Plant. 722; Britt. Man. Fl. U.S.A. 549. *Locust-tree.* North Island: Naturalized in several localities between Auckland, Rotorua, and the Upper Waikato, mostly near abandoned Maori settlements. (North America.)

Ornithopus perpusillus Linn. Sp. Plant. 743; Hook. f. Student's Fl. 105. *Common Birdsfoot.* North Island: Newly-sown grass-paddocks at Brookby, Auckland, *H. E. Potter!* (Europe; North Africa.)

Coronilla varia Linn. Sp. Plant. 743; DC. Prodr. ii, 310. South Island: A garden escape in the vicinity of Nelson, *T. F. C.* (South Europe; West Asia.)

Onobrychis viciaefolia Scop. Fl. Carn. ii, 106; Bab. Brit. Bot. ed. viii, 104. *Sainfoin.* North and South Islands: An occasional escape from cultivation, but scarcely naturalized. (Europe; North and West Asia.)

Vicia tetrasperma Moench Meth. 148; Hook. f. Student's Fl. 107. *Slender Tare.* North and South Islands: Roadsides and hedges, &c., fairly plentiful. (Europe; North and West Asia to India; North Africa.)

Vicia hirsuta S. F. Gray Nat. Arr. Brit. Pl. ii, 614; Hook. f. Student's Fl. 107. *Common Tare.* North and South Islands: Roadsides and waste places, not uncommon. (Europe; North and West Asia; North Africa.)

Vicia Cracca Linn. Sp. Plant. 735; Hook. f. Student's Fl. 107. *Tufted Vetch.* South Island: Opawa River, Marlborough, *T. Kirk;* roadsides near Christchurch, *J. B. Armstrong.* (Europe; North and West Asia to India; North Africa; North America.)

Vicia sativa Linn. Sp. Plant. 736; Hook. f. Student's Fl. 109. *Common Vetch.* North and South Islands, Stewart Island: Cultivated fields and waste places, abundant. (South Europe; North and West Asia; North Africa.)

Vicia narbonensis Linn. Sp. Plant. 737; DC. Prodr. ii, 364. North and South Islands: Port Fitzroy (Great Barrier Island), *T. Kirk!* Parapara (near Collingwood), *F. G. Gibbs!* (South Europe.)

Lens esculenta Moench Meth. 131. *Common Lentil.* Naturalized in the Auckland Domain for many years, but apparently is being thrust out by more aggressive plants. (South Europe.)

Lathyrus odoratus Linn. Sp. Plant. 732; DC. Prodr. ii, 374. *Sweet-pea.* North and South Islands: An occasional garden escape in rich warm soils, but soon disappears. (South Europe.)

Lathyrus latifolius Linn. Sp. Plant. 733; DC. Prodr. ii, 370. *Everlasting Pea.* North and South Islands: An occasional garden escape. (Europe.)

Acacia armata R. Br. in Ait. Hort. Kew, ed. ii, v, 463; Benth. Fl. Austral. ii, 347. *Kangaroo-acacia.* North Island: Often planted for hedges and occasionally spreads. (Australia.)

Acacia decurrens Willd. Sp. Plant. iv, 1072; Benth. Fl. Austral. ii, 414. *Black-wattle.* North Island: Largely planted for tanning and other purposes and occasionally spreads. (Australia.)

Acacia dealbata Link. Enum. Hort. Berol. 445; Benth. Fl. Austral. ii, 415. *Silver-wattle.* North Island: Often planted with the preceding species and occasionally spreads. (Australia.)

Albizzia lophantha in Hook. Lond. Journ. Bot. iii, 86; Benth. Fl. Austral. ii, 421. *Brush-wattle.* North Island: Naturalized in several localities in the Auckland and Taranaki Provincial Districts, sometimes forming large groves. (Australia.)

Geraniaceae.

Geranium Robertianum Linn. Sp. Plant. 681; Hook. f. Student's Fl. 82. *Herb-robert.* North and South Islands: Fields and waste places from Whangarei southwards, not common. (Europe; North and West Asia.)

Erodium cicutarium L'Herit. ex Ait. Hort. Kew, ii, 414; Hook. f. Student's Fl. 83. *Stork's-bill.* North and South Islands, Stewart Island, Chatham Islands: Cultivated fields and waste places, abundant. (Europe; North and West Asia to India; North Africa.)

Erodium moschatum L'Herit. *l.c. Musky Stork's-bill.* North and South Islands: Roadsides and waste places, plentiful. (Europe; West Asia; North Africa.)

Erodium malachoides Willd. Phyt. 10; DC. Prodr. i, 648. North Island: Sandy places near the sea. Mangonui and the Bay of Islands, *T. F. C.;* Wellington, *T. Kirk.* (South Europe; West Asia to India; North Africa.)

Pelargonium zonale L'Herit. ex Ait. Hort. Kew, ii, 424; Harv. and Sond. Fl. Cap. i, 298. North Island: Waste places and deserted places, not uncommon. (South Africa.)

Pelargonium quercifolium L'Herit. Ger. t. 14; Harv. and Sond. Fl. Cap. i, 306. North Island: An occasional garden escape, not common. (South Africa.)

OXALIDACEAE.

Oxalis cernua Thunb. Diss. Oxal. 14; Harv. and Sond. Fl. Cap. i, 348. North and South Islands: A troublesome weed in gardens and waste places as far south as Taranaki and Nelson; less abundant farther south. (South Africa.)

Oxalis variabilis Jacq. Oxal. 89; Harv. and Sond. Fl. Cap. i, 331. North Island: An occasional garden escape near Auckland, not common. (South Africa.)

Several other species of *Oxalis* have been noticed as garden escapes, but they do not persist.

TROPAEOLACEAE.

Tropaeolum majus Linn. Sp. Plant. 345; DC. Prodr. i, 683. *Indian Cress.* North and South Islands: Gardens, waste places, railway embankments, &c.; a common weed as far south as Wellington and Nelson. (Peru.)

LINACEAE.

Linum marginale A. Cunn. ex Hook. Lond. Journ. Bot. vii, 169; Benth. Fl. Austral. i, 283. North and South Islands: Generally distributed in fields and waste places from the North Cape southwards; most plentiful in the North Island. (Australia.)

Linum usitatissimum Linn. Sp. Plant. 277; Hook. f. Student's Fl. 78. *Common Flax.* North and South Islands: An occasional escape from cultivation, but does not persist. (Europe; West Asia to India.)

Linum gallicum Linn. Sp. Plant. 401; DC. Prodr. i, 423. Fields and waste places as far south as the East Cape, not uncommon. (South Europe; North Africa.)

Linum catharticum Linn. Sp. Plant. 281; Hook. f. Student's Fl. 78. *Purging-flax.* North and South Islands: Fields and waste places. Near Tauranga, *T. F. C.;* vicinity of Nelson, *R. J. Kingsley;* common near Ashburton, *W. W. Smith. H. H. Allan;* vicinity of Dunedin, *G. M. Thomson.*

ZYGOPHYLLACEAE.

Tribulus terrestris Linn. Sp. Plant. 387; Hook. f. Fl. Brit. India, i, 423. North Island: On shingle at Port Ahuriri, Napier, *F. Hutchinson!* (A common tropical weed.)

POLYGALACEAE.

Polygala myrtifolia Linn. Sp. Plant. 703; Harv. and Sond. Fl. Cap. i, 83. North Island: Not uncommon as a garden escape. Mongonui County, *H. Carse!* in several localities in the vicinity of Auckland, *T. F. C.;* near Napier, *Colenso!* (South Africa.)

Polygala virgata Thunb. Prod. Pl. Cap. 120; Harv. and Sond. Fl. Cap. i, 85. North Island: Probably a garden escape. Among fern and *Leptospermum* scrub at Mangatete, near Awanui, *H. Carse!* edge of forest at Kaitaia, *Mrs. Foley!* in several places near Kihikihi, *N. M. Lethbridge!* (South Africa.)

Polygala vulgaris Linn. Sp. Plant. 703; Hook. f. Student's Fl. 50. *Milkwort.* South Island: Open ground at Waitati, near Dunedin, *Miss E. Woodhead.* (Europe; North and West Asia; North Africa.)

EUPHORBIACEAE.

Euphorbia helioscopia Linn. Sp. Plant. 459; Hook. f. Student's Fl. 356. *Sun-spurge.* North and South Islands: Roadsides and waste places, not uncommon. (Europe; North and West Asia to India and Japan.)

Euphorbia Peplus Linn. Sp. Plant. 456; Hook. f. Student's Fl. 358. *Milk-weed.* Kermadec Islands, North and South Islands, Chatham Islands, Stewart Island: Gardens and waste places, a most abundant weed. (Europe; North and West Asia; North Africa.)

Euphorbia Lathyris Linn. Sp. Plant. 457; Hook. f. Student's Fl. 359. *Caper-spurge.* North and South Islands: Waste places in rich warm soils, not common. (South Europe.)

Euphorbia hypericifolia Linn. Sp. Plant. 454; Hook. f. Fl. Brit. Ind. v, 249. North Island: Streets of Auckland; once well established, now nearly extinct. (Tropics of both hemispheres.)

Euphorbia ovalifolia Engelm. ex Klotsche and Garcke in Abh. Akad. Berl. (1860) 26. North Island: Ballast at Wellington, *T. Kirk!* (Temperate South America.)

Euphorbia segetalis Linn. Sp. Plant. 657. North Island: On sand-dunes near Tauroa, near Ahipara. (South Europe; North Africa.)

Euphorbia cyparissias Linn. Sp. Plant. 661. South Island: Near Culverden, *J. W. Murphy*. (Europe.)

Ricinus communis Linn. Sp. Plant. 1007; Muell. Arg. in DC. Prodr. xv, 2, 1017. *Castor-oil*. North Island: Waste places on warm rich soils from Mangonui to the Waikato River, not common. (All tropical countries.)

Ampelidaceae.

Vitis vinifera Linn. Sp. Plant. 202; DC. Prodr. i, 633. *Vine*. North Island: Often lingers in deserted gardens, old Maori cultivations, &c. (West Asia.)

Sapindaceae.

Melianthus major Linn. Sp. Plant. 639; Harv. and Sond. Fl. Cap. i, 367. North Island: Not uncommon as a garden escape. (Cape Colony.)

Malvaceae.

Lavatera arborea Linn. Sp. Plant. 690; Hook. f. Student's Fl. 76. *Tree-mallow*. North and South Islands: An occasional garden escape. (Coasts of West and South Europe.)

Malva sylvestris Linn. Sp. Plant. 689; Hook. f. Student's Fl. 76. *Common Mallow*. North and South Islands: Roadsides and waste places, not common. (Europe; North and West Asia to China and India; North Africa.)

Malva rotundifolia Linn. Sp. Plant. 688; Hook. f. Student's Fl. 76. *Dwarf Mallow*. North and South Islands: Roadsides and waste places, not uncommon. (Europe; North and West Asia to the Himalayas.)

Malva parviflora Linn. Amoen. Acad. ii, 416; DC. Prodr. i, 433. North and South Islands: Roadsides and waste places, abundant. (Europe; West Asia to India and China; North Africa.)

Malva verticillata Linn. Sp. Plant. 689; DC. Prodr. i, 433. North and South Islands: Waste places, abundant. (Europe; North and West Asia to China and India; North Africa.)

Malva crispa Linn. Syst. Nat. 1147; DC. Prodr. i, 433. North Island: A garden escape at Port Waikato, *T. Kirk*. (Europe; West Asia.)

Modiola multifida Moench Meth. 620; Asa Gray Man. 58. North Island: Pastures and roadsides, abundant. (Eastern States of North America.)

Hypericaceae.

Hypericum Androsaemum Linn. Sp. Plant. 784; Hook. f. Student's Fl. 72. *Tutsan*. North and South Islands: Roadsides and waste places, not uncommon. (Europe; West Asia; North Africa.)

Hypericum perforatum Linn. Sp. Plant. 785; Hook. f. Student's Fl. 72. *St. John's Wort*. North and South Islands: Abundant. (Europe; North and West Asia to China and India; North Africa.)

Hypericum humifusum Linn. Sp. Plant. 785; Hook. f. Student's Fl. 73. *Trailing Hypericum*. North and South Islands: Common, especially on clay soils. (Europe; India; Canary Islands.)

Violaceae.

Viola tricolor Linn. Sp. Plant. 935; Hook. f. Student's Fl. 49. *Pansy*. North and South Islands: Cultivated fields and waste places, local. (North Europe to Siberia and North-west India; North Africa.)

Viola tricolor var. *arvensis* Murr.; Hook. f. Student's Fl. 49. North and South Islands: Cultivated fields, not common.

Ionidium filiforme F. Muell. Pl. Vict. i, 66; Benth. Fl. Austral. i, 103. North Island: Grassy places near Lake Takapuna, Auckland, *Miss Rolleston!* (Australia.)

Lythraceae.

Peplis Portula Linn. Sp. Plant. 332; Hook. f. Student's Fl. 155. *Water-purslane*. South Island: Various localities in the east of Otago, *Petrie!* (Europe; North Africa.)

Lythrum Hyssopifolia Linn. Sp. Plant. 447; Hook. f. Student's Fl. 154. *Hyssop Loose-strife*. North and South Islands: Moist places, ditches, &c., abundantly naturalized. (Europe; North and West Asia; North Africa.)

Lythrum Graefferi Tenore, Prod. Fl. Nap. lxviii. North and South Islands: Various localities in the Auckland District, *T. Kirk! T. F. C.;* Greymouth, *Helms!* (South Europe; North Africa.)

MYRTACEAE.

Eucalyptus globulus Labill. Voy. i, 153, t. 13; Benth. Fl. Austral. iii, 225. *Blue-gum.* North and South Islands: Seedlings frequently appear in the vicinity of plantations. (Australia.)

Eucalyptus radiata Sieb. in DC. Prodr. iii (1828) 218. South Island: Waitati, seedlings spreading into ground which had been covered with manuka and burned, *G. M. Thomson.* (East Australia; Tasmania.)

OENOTHERACEAE.

Oenothera biennis Linn. Sp. Plant. 346; Hook. f. Student's Fl. 159. *Evening-primrose.* North and South Islands: Roadsides and waste places, not common. (North America.)

Oenothera odorata Jacq. Ic. Plant. Rar. iii, 3, t. 456; Hook. f. Student's Fl. 159. *Evening-primrose.* North Island: Abundant in light dry soils and sandy places near the sea. (Chile; Patagonia.)

Oenothera tetraptera Cav. Ic. iii, 40, t. 279. North Island: A garden escape near Auckland, rare. (Mexico.)

UMBELLIFERAE.

Conium maculatum Linn. Sp. Plant. 243; Hook. f. Student's Fl. 167. *Hemlock.* North and South Islands: Waste places, local. (Europe; North and West Asia; North Africa.)

Bupleurum rotundifolium Linn. Sp. Plant. 236; Hook. f. Student's Fl. 168. *Hare's-ear.* North Island: Cultivated fields and waste places. Near Auckland, *T. F. C.;* Wellington, *T. Kirk!* South Island: Near Christchurch, *J. B. Armstrong.* (Europe; West Asia to the Caucasus.)

Apium graveolens Linn. Sp. Plant. 264; Hook. f. Student's Fl. 169. *Celery.* North and South Islands: Has established itself in several districts in marshy places near the sea. (Europe; West Asia; India; North Africa.)

Apium leptophyllum F. Muell. ex Benth. Fl. Austral. iii, 372. North Island: Waste places from Mangonui to Wellington, not common. (South America; tropical Africa; Australia.)

Ammi majus Linn. Sp. Plant. 243. North Island: Waste places near Auckland, rare. (Europe; West Asia; North Africa.)

Carum Carui Linn. Sp. Plant. 263; Hook. f. Student's Fl. 171. *Caraway.* South Island: Near Dunedin, rare, *A. Hamilton.* (Europe; North and West Asia; India.)

Carum Petroselinum Benth. and Hook. Gen. Plant. i, 891; Hook. f. Student's Fl. 171. *Common Parsley.* North and South Islands: Waste places and roadsides, not uncommon. (South Europe; North Africa.)

Scandix Pecten-Veneris Linn. Sp. Plant. 256; Hook. f. Student's Fl. 175. *Venus's Comb.* North and South Islands: Waste places, far from common. (Europe; West Asia to India; North Africa.)

Foeniculum vulgare Mill. Gard. Dict. ed. viii, n. 1: *F. officinale* All.; Hook. f. Student's Fl. 177. *Fennel.* North and South Islands: Waste places and roadsides, abundant. (Europe; North and West Asia to India; North Africa.)

Peucedanum sativum Benth. and Hook. f. Gen. Plant. i, 920; Hook. f. Student's Fl. 183. *Parsnip.* North and South Islands: An occasional escape from cultivation, but not common. (Europe; North Asia.)

Daucus Carota Linn. Sp. Plant. 242; Hook. f. Student's Fl. 184. *Wild Carrot.* North and South Islands: Fields and roadsides, not uncommon. (Europe; North and West Asia to India; North Africa.)

Caucalis nodosa Scop. Fl. Carn. i, 192; Hook. f. Student's Fl. 186. North and South Islands: Waste places, not abundant. (Europe; West Asia to India; North Africa.)

ARALIACEAE.

Hedera Helix Linn. Sp. Plant. 202; Hook. f. Student's Fl. 187. *Ivy.* North and South Islands: Occasionally spreading from gardens and plantations. (Europe; West Asia to India; China and Japan; North Africa.)

EPACRIDACEAE.

Epacris purpurascens R. Br. Prodr. 550; Benth. Fl. Austral. iv, 241. North Island: Open tea-tree country at the head of the Manukau Harbour, near Papakura and Drury. (Australia.)

Epacris microphylla R. Br. Prodr. 550; Benth. Fl. Austral. iv, 240. North Island: In the same locality as the preceding species, *A. T. Urquhart!* (Australia.)

Epacris pulchella Cav. Ic. iv, 26, t. 345; Benth. Fl. Austral. iv, 241. North Island: In the same locality as *E. purpurascens*, *A. T. Urquhart!* (Australia.)

Ericaceae.

Calluna vulgaris Salisb. Trans. Linn. Soc. vi, 317. *Ling; Heather.* North Island: Tongariro National Park. (Europe; Greenland; North America.)

Primulaceae.

Anagallis arvensis Linn. Sp. Plant. 148; Hook. f. Student's Fl. 265. *Pimpernel.* North and South Islands, Stewart Island, Chatham Islands: Fields and waste places, abundant. (Europe; West Asia to India; North Africa.)

Gentianaceae.

Erythraea Centaurium Pers. Syn. i, 283; Hook. f. Student's Fl. 271. *Centaury.* North and South Islands: Abundant throughout. (Europe; North Africa.)

Chlora perfoliata Willd. Sp. Pl. ii, 340. North Island: Manuka scrub at Parengarenga, *W. R. B. Oliver!* (Europe; North Africa; West Asia.)

Apocynaceae.

Vinca major Linn. Sp. Plant. 209; Hook. f. Student's Fl. 269. *Periwinkle.* North and South Islands: Roadsides and waste places, a plentiful garden escape. (South Europe; West Asia to the Caucasus; North Africa.)

Asclepiadaceae.

Gomphocarpus fruticosus R. Br. in Mem. Wern. Soc. i (1809) 38; DC. Prodr. vii, 557. North Island: An occasional garden escape near Auckland and Napier, rare. (Arabia; North Africa; now naturalized in most warm countries.)

Convolvulaceae.

Ipomoea batatas Poir. Encycl. vi, 14. *Kumara.* North Island: Introduced by the Maoris from Polynesia, and still largely cultivated by them. It often lingers for some time in deserted plantations. (Native country uncertain; now cultivated in all warm climates.)

Convolvulus arvensis Linn. Sp. Plant. 153; Hook. f. Student's Fl. 284. *Smaller Bindweed.* North and South Islands: Fields and waste places, not uncommon. (Europe; North and West Asia to India; North Africa.)

Cuscuta racemosa Mart. Reise. Bras. i, 286, var. *Chiliana* Engelm. Cusc. 505: *C. Hassiaca* Pfeiff. in Bot. Zeit. i (1843) 705; T. Kirk in Trans. N.Z. Inst. xx (1888) 182. South Island: Fields in the Canterbury Provincial District, parasitic on lucerne, knot-grass, &c. (Chile, from whence it has been carried to North America and Europe.)

Cuscuta Epilinum Weihe in Archiv. Apoth. viii (1824) 54; Hook. f. Student's Fl. 285. *Flax-dodder.* South Island: Has been recorded from the Canterbury District, but I have seen no specimens. (Europe; East Asia.)

Cuscuta Epithymum Murr. Syst. ed. xiii, 140; Hook. f. Student's Fl. 285. *Lesser Dodder.* North and South Islands: From Auckland to Foveaux Strait, abundant in many places, and parasitic on a great variety of plants, including many indigenous species. Mr. Kirk's *C. novae-zelandiae* (Trans. N.Z. Inst. xx (1888) 183, name only) appears to be identical with it The var. *Trifolii (Clover-dodder)*, which usually attacks clover, is also introduced. (Europe; North Asia.)

Polemoniaceae.

Collomia coccinea Lehm. ex Benth. in Bot. Reg. t. 1622; DC. Prodr. ix, 308. North and South Islands: A garden escape in a few localities. Vicinity of Auckland, *T. F. C.*; near Roxburgh, *Petrie!* Cardrona, *T. Kirk!* (Chile.)

Gilia squarrosa Hook. and Arn. Bot. Beech. Voy. 151; Wats. Bot. Calif. i, 493. North and South Islands: Dry pastures, not uncommon. (California.)

BORAGINACEAE.

Amsinckia angustifolia Lehm. Del. Sem. Hort. Hamb. (1831) 7. South Island: Interior of Otago, Alexandra South, Black's, *Petrie!* (Chile.)

Borago officinalis Linn. Sp. Plant. 137; Hook. f. Student's Fl. 276. *Borage.* North Island: Waste places from Auckland to Wellington, not uncommon. South Island: Local. (Europe; North Africa.)

Myosotis palustris Lam. Fl. Fr. ii, 283; Hook. f. Student's Fl. 280. *Forget-me-not.* North and South Islands: Not uncommon in wet places. (Europe; North Asia.)

Myosotis caespitosa Schultz, Prodr. Fl. Starg. Suppl. i, 11; Hook. f. Student's Fl. 281. North and South Islands: Not uncommon in wet places. (Europe; North and West Asia to India.)

Myosotis sylvatica Hoffm. Deutschl. Fl. ed. i, 61; Hook. f. Student's Fl. 281. North and South Islands: Waste places, not uncommon. (Europe; North and West Asia; North Africa.)

Myosotis arvensis Lam. Fl. Fr. ii, 213; Hook. f. Student's Fl. 281. North and South Islands: Fields and waste places, local. (Europe; North and West Asia to India; North Africa.)

Myosotis collina Hoffm. Deutschl. Fl. ed. i, 61; Hook. f. Student's Fl. 282. North and South Islands: Fields and waste places, not common. (Europe; West Asia; North Africa.)

Lithospermum arvense Linn. Sp. Plant. 132; Hook. f. Student's Fl. 279. *Corn-gromwell.* North and South Islands: Fields and waste places, plentiful. (Europe; North and West Asia to India; North Africa.)

Echium vulgare Linn. Sp. Plant. 139; Hook. f. Student's Fl. 276. *Viper's Bugloss.* North and South Islands: Roadsides and waste places, local. (Europe; North Asia; North Africa.)

Echium plantagineum Linn. Mant. ii, 202; Hook. f. Student's Fl. 276. North Island: Waste places, rare. Vicinity of Auckland, *T. F. C.;* ballast at Wellington, *T. Kirk!* Kihikihi, Waikato, *J. B. Hayes.* South Island: Near Ashburton, *H. H. Allan;* Otaio River, Awapiri, common in both localities, *G. M. Thomson.* (South Europe; North Africa.)

Symphytum officinale Linn. Sp. Plant. 195. *Comfrey.* North Island: Abundant in many localities. South Island: Near Christchurch, *G. M. Thomson.* (Europe; North America.)

VERBENACEAE.

Verbena officinalis Linn. Sp. Plant. 20; Hook. f. Student's Fl. 313. *Vervain.* North and South Islands: Fields and roadsides, not uncommon. (Europe; West Asia to India; North Africa.)

Verbena bonariensis Linn. Sp. Plant. 20; Benth. Fl. Austral. v, 36. North Island: Waste places near Auckland, rare. Near Kaitaia, *H. Carse!* near New Plymouth, *T. S. Crompton!* (Extra-tropical South America.)

Lantana camara Linn. Sp. Plant. 874. North Island: Hokianga River. (Tropical America.)

LABIATAE.

Mentha viridis Linn. Sp. Plant. ed. ii, 804; Hook. f. Student's Fl. 315. *Spearmint.* North and South Islands: Waste places, ditches, &c., not uncommon. (Europe; North Asia; North Africa.)

Mentha piperita Linn. Sp. Plant. 576; Hook. f. Student's Fl. 316. *Peppermint.* North and South Islands: An occasional garden escape in damp places. (Europe.)

Mentha aquatica Linn. Sp. Plant. 576; Hook. f. Student's Fl. 316. *Watermint.* North Island: Wet places in the Auckland District, not common. South Island: Peel Forest, *H. H. Allan.* (Europe; North and West Asia; North Africa.)

Mentha arvensis Linn. Sp. Plant. 577; Hook. f. Student's Fl. 317. North Island: Fields and waste places, not uncommon. South Island: Canterbury, *J. B. Armstrong.* (Europe; North and West Asia to China and India.)

Mentha australis R. Br. Prodr. 505; Benth. Fl. Austral. v, 83. North Island: Raglan, *T. F. C.;* Wairarapa, *T. Kirk!* (Australia.)

Mentha Pulegium Linn. Sp. Plant. 577; Hook. f. Student's Fl. 318. *Pennyroyal.* North and South Islands: Fields and waste places, an abundant weed, especially in the Auckland District. (Europe; North and West Asia; North Africa.)

Thymus Serpyllum Linn. Sp. Plant. 590; Hook. f. Student's Fl. 319. *Thyme.* North and South Islands: An occasional garden escape, not common. (Europe; North and West Asia to the Himalayas; North Africa.)

Melissa officinalis Linn. Sp. Plant. 592; Hook. f. Student's Fl. 321. *Balm.* North and South Islands: A garden escape in a few localities. (South Europe; West Asia.)

Salvia Verbenaca Linn. Sp. Plant. 25; Hook. f. Student's Fl. 321. *Wild Sage.* North Island: Waste places near Auckland, *T. Kirk! T. F. C.*

Nepeta Cataria Linn. Sp. Plant. 570; Hook. f. Student's Fl. 322. *Catmint.* North Island: Waste places and roadsides in the Auckland Provincial District, not common. Great Barrier Island, *T. Kirk.* South Island: Nydia Bay, Marlborough, *E. F. Paton.* (Europe; North and West Asia to the Himalayas.)

Nepeta Glechoma Benth. Lab. Gen. et Sp. 485; Hook. f. Student's Fl. 323. *Ground-ivy.* North Island: Vicinity of Wanganui, *T. Kirk.* (Europe; North and West Asia.)

Cedronella triphylla Moench Meth. 411; Benth. in DC. Prodr. xii, 406. North Island: Waste places near Auckland, *T. F. C.*; near Wellington, *T. Kirk!* (Canary Islands.)

Prunella vulgaris Linn. Sp. Plant. 600; Hook. f. Student's Fl. 323. *Self-heal.* North and South Islands, Stewart Island, Chatham Islands: Abundant throughout. (Europe; North and West Asia; North Africa; North America.)

Marrubium vulgare Linn. Sp. Plant. 583; Hook. f. Student's Fl. 325. *Horehound.* North and South Islands: Roadsides and waste places, abundant. (Europe; West Asia to India; North Africa.)

Stachys palustris Linn. Sp. Plant. 580; Hook. f. Student's Fl. 325. North Island: Near Wanganui, *T. Kirk.* (Europe; North and West Asia to India; North America.)

Stachys arvensis Linn. Sp. Plant. ed. ii, 814; Hook. f. Student's Fl. 326. North Island: Cultivated fields, an abundant weed. (Europe; North and West Asia; North Africa.)

Galeopsis Tetrahit Linn. Sp. Plant. 579; Hook. f. Student's Fl. 327. *Hemp-nettle.* North Island: Waste places in the vicinity of Auckland, rare. (Europe; North and West Asia to India.)

Lamium purpureum Linn. Sp. Plant. 579; Hook. f. Student's Fl. 328. *Dead-nettle.* North and South Islands: Cultivated ground at Wanganui, *T. Kirk*; Ashburton, *W. W. Smith.* (Europe; North and West Asia; North Africa.)

Lamium album Linn. Sp. Plant. 809. *White Dead-nettle.* North Island: Tarata (Taranaki), Feilding, *H. H. Allan.* South Island: Near Christchurch, *G. M. Thomson.* (Europe; Siberia.)

Teucrium Scorodonia Linn. Sp. Plant. 789. *Wood-sage.* South Canterbury. (Europe.)

Solanaceae.

Lycopersicum esculentum Mill. Gard. Dict. ed. viii, n. 2; DC. Prodr. xiii, 26. *Tomato.* North and South Islands: An occasional garden escape of short duration. (Tropical America.)

Solanum tuberosum Linn. Sp. Plant. 185; DC. Prodr. xiii, 31. *Potato.* North and South Islands: Often lingers for a time in places where it has been cultivated. (South America.)

Solanum marginatum Linn. f. Suppl. 147; DC. Prodr. xiii, 370. North Island: A garden outcast near Auckland. (Tropical Africa.)

Solanum sodomaeum Linn. Sp. Plant. 187; Benth. Fl. Austral. iv, 458. *Dead-sea Apple.* North Island: From the North Cape to the Upper Waikato, on warm dry soils and on sand-dunes, not uncommon. (South Europe; North Africa.)

Solanum auriculatum Ait. Hort. Kew, ed. i, 246; Benth. Fl. Austral. iv, 450. North Island: Waste places in the vicinity of Auckland, increasing. (Tropical America, and widely naturalized in warm countries.)

Physalis peruviana Linn. Sp. Plant. ed. ii, 1670; Benth. Fl. Austral. iv, 466. *Cape Gooseberry.* North Island: An escape from cultivation in warm dry soils, not common. South Island: As far south as Moeraki, *G. M. Thomson.* (South America.)

Nicandra physaloides Gaertn. Fruct. ii, 237; Benth. Fl. Austral. iv, 465. North Island: Waste places in the vicinity of Auckland, scarce. South Island: Near Ashburton, *W. W. Smith.* (Peru.)

Lycium chinense Mill. Gard. Dict. ed. viii, n. 5; Benth. Fl. Austral. iv, 467. North and South Islands: Waste places and roadsides, not uncommon. (China.)

Lycium horridum Thunb. Prodr. 37. *Boxthorn.* North Island: Spreading in many parts, *G. M. Thomson.* (Cape Colony.)

Datura Stramonium Linn. Sp. Plant. 179; Benth. Ill. Handb. Brit. Fl. 592. *Thorn-apple.* North and South Islands: Waste places in rich warm soils as far south as Canterbury, not uncommon. (Native or naturalized in most warm countries.)

Hyoscyamus niger Linn. Sp. Plant. 179; Hook. f. Student's Fl. 286. *Henbane.* North Island: Near Pakuranga, Auckland, *R. Green!* ballast at Wellington, *T. Kirk!* (Europe; North and West Asia to India.)

Nicotiana Tabacum Linn. Sp. Plant. 180; DC. Prodr. xiii, 557. *Tobacco.* North Island: An occasional escape from cultivation in rich warm soils. (Indigenous in America; now cultivated in all warm countries.)

Nicotiana acutiflora A. St. Hil. Pl. Rem. Bras. 209. North Island: Ballast at Wellington, *T. Kirk!* (Brazil.)

Petunia parviflora Juss. in Ann. Mus. Par. ii (1803) 216, t. 47; Asa Gray Syn. Fl. North Amer. ii, 243. North Island: Ballast at Wellington, *T. Kirk.* (Southern United States to Buenos Ayres.)

SCROPHULARIACEAE.

Verbascum Thapsus Linn. Sp. Plant. 177; Hook. f. Student's Fl. 291. *Mullein.* North and South Islands: Abundantly naturalized in dry places. (Europe; North and West Asia to the Himalayas.)

Verbascum Blattaria Linn. Sp. Plant. 178; Hook. f. Student's Fl. 292. *Moth-mullein.* North and South Islands: Pastures and waste places, not uncommon. (Europe: North Asia.)

Celsia cretica Linn. f. Suppl. 281; Benth. in DC. Prodr. x, 244. North Island: Fields in the Auckland District, not uncommon. (South Europe; North Africa.)

Linaria vulgaris Mill. Gard. Dict. ed. viii, n. 1; Hook. f. Student's Fl. 294. *Toad-flax.* South Island: Near Lake Brunner, *J. W. Brame!* Ashburton, *W. W. Smith.* (Europe; North Asia.)

Linaria purpurea Mill. Gard. Dict. ed. viii, n. 5; Benth. in DC. Prodr. x, 278. South Island: A garden escape in some parts of Canterbury and Otago. (South Europe.)

Linaria latifolia Desf. Fl. Atlant. ii, 40, t. 134; Benth. in DC. Prodr. x, 271. North Island: A garden escape in the vicinity of Wellington, *T. Kirk!* (South Europe; North Africa.)

Linaria Elatine Mill. Gard. Dict. ed. viii, n. 16; Hook. f. Student's Fl. 293. North and South Islands: Roadsides and waste places, not uncommon. (Europe; West and Central Asia.)

Linaria Cymbalaria Mill. Gard. Dict. ed. viii, n. 17; Hook. f. Student's Fl. 293. North and South Islands: An occasional garden escape. Lava-fields, Mount Wellington. (South Europe.)

Antirrhinum Orontium Linn. Sp. Plant. 617; Hook. f. Student's Fl. 295. North Island: Waste places near Auckland, *T. F. C.;* Napier, *A. Hamilton!* (Europe; West Asia to India; North Africa.)

Mimulus luteus Linn. Sp. Plant. ed. ii, 884; Asa Gray Syn. Fl. North Amer. ii, 277. North and South Islands: Damp places, sides of streams, &c., from Wellington southwards. (Western North America.)

Mimulus moschatus Dougl. in Lindl. Bot. Reg. t. 1118; Asa Gray Syn. Fl. North Amer. ii, 278. North and South Islands: Sides of streams from Wellington southwards, common. (Western North America.)

Digitalis purpurea Linn. Sp. Plant. 621; Hook. f. Student's Fl. 298. *Foxglove.* North and South Islands: An occasional garden escape, not uncommon. (Europe.)

Veronica agrestis Linn. Sp. Plant. 13; Hook. f. Student's Fl. 299. Kermadec Islands, North and South Islands: Fields and waste places, abundant. (Europe; North and West Asia to the Himalayas; North Africa.)

Veronica Buxbaumii Ten. Fl. Nap. i, 7, t. 1; Hook. f. Student's Fl. 299: *V. areolata* Col. in Trans. N.Z. Inst. xxiv (1892) 392. North and South Islands: Cultivated fields, abundant. (Europe; West Asia to the Himalayas; North Africa.)

Veronica arvensis Linn. Sp. Plant. 13; Hook. f. Student's Fl. 300: *V. longeracemosa* Col. in Trans. N.Z. Inst. xx (1888) 203, and *V. hirsuta* Col. *l.c.* xxiv (1892) 393. Kermadec Islands, North and South Islands, Stewart Island: Fields and waste places, abundant throughout. (Europe; North and West Asia to India; North Africa.)

Veronica serpyllifolia Linn. Sp. Plant. 12; Hook. f. Student's Fl. 300: *V. macrocalyx* and *V. rugulosella* Col. in Trans. N.Z. Inst. xxiv (1892) 391: *V. oligantha* Col. *l.c.* xxv (1893) 333. North and South Islands, Stewart Island: Fields and waste places, abundant throughout. (Europe; North and West Asia to the Himalayas; North America.

Veronica officinalis Linn. Sp. Plant. 11; Hook. f. Student's Fl. 301. South Island: Has been recorded from the Canterbury District by *J. B. Armstrong* and *W. W. Smith*, but I have seen no specimens. (Europe; North and West Asia to the Himalayas; North America.)

Bartsia viscosa Linn. Sp. Plant. 602; Hook. f. Student's Fl. 303. North and South Islands: Abundant in fields in most districts. (Europe; West Asia; North Africa.)

OROBANCHACEAE.

Orobanche minor Sutt. in Trans. Linn. Soc. iv (1798) 179; Hook. f. Student's Fl. 309. *Broom-rape.* North and South Islands: Fields as far south as Nelson, most abundant in the Auckland District; parasitic on *Trifolium*, *Medicago*, *Hypochaeris*, &c. (Europe; West Asia; North Africa.)

PLANTAGINACEAE.

Plantago major Linn. Sp. Plant. 112; Hook. f. Student's Fl. 288. *Greater Plantain.* North and South Islands, Stewart Island, Chatham Islands: Roadsides and waste places, abundant. (Europe; North and West Asia to India; North Africa.)

Plantago media Linn. Sp. Plant. 113; Hook. f. Student's Fl. 289. North and South Islands: Fields and waste places, not common. (Europe; West Asia.)

Plantago lanceolata Linn. Sp. Plant. 113; Hook. f. Student's Fl. 289. *Ribwort.* Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Abundant throughout. (Europe; North and West Asia; and now naturalized in almost all parts of the world.)

Plantago varia R. Br. Prodr. 424; Benth. Fl. Austral. v, 139. North and South Islands: Sparingly naturalized in several localities between the East Cape and Banks Peninsula. (Australia.)

Plantago hirtella H. B. K. Nov. Gen. et Sp. ii, 229; Asa Gray Syn. Fl. North Amer. ii, 392. North Island: Most shaded places, not uncommon. (California; Mexico; Chile.)

Plantago Coronopus Linn. Sp. Plant. 115; Hook. f. Student's Fl. 289. North and South Islands: Sandy and gravelly places, not uncommon. (Europe; West Asia; North Africa.)

RUBIACEAE.

Galium palustre Linn. Sp. Plant. 105; Hook. f. Student's Fl. 193. North Island: Swamps near Mauku (Manukau Harbour), *H. Carse!* (Europe; North and West Asia; North Africa.)

Galium Mollugo Linn. Sp. Plant. 107; Hook. f. Student's Fl. 194. North Island: Between the Manukau Harbour and the Waikato River, *H. Carse!* (Europe; North and West Asia to the Himalayas; North Africa.)

Galium Aparine Linn. Sp. Plant. 108; Hook. f. Student's Fl. 194. *Goose-grass.* North and South Islands: Hedges and waste places, not uncommon. (Europe; North and West and Central Asia; North Africa.)

Galium parisiense Linn. Sp. Plant. 108: *G. anglicum* Huds.; Hook. f. Student's Fl. 195. North and South Islands: Local. Whangarei, *T. Kirk;* vicinity of Auckland, *T. F. C.;* Motueka, *R. J. Kingsley.* (South Europe; West Asia to the Caucasus; North Africa.)

Galium verum Linn. Sp. Plant. 155. North Island: Mahurangi, *D. Ross!* (Europe; temperate Asia.)

Sherardia arvensis Linn. Sp. Plant. 102; Hook. f. Student's Fl. 195. *Field-madder.* North and South Islands: Fields and waste places, abundant throughout. (Europe; West Asia to Persia; North Africa.)

CAPRIFOLIACEAE.

Sambucus nigra Linn. Sp. Plant. 269; Hook. f. Student's Fl. 189. *Elder.* North and South Islands: A frequent garden escape, sometimes forming thickets. (Europe; West Asia; North Africa.)

Sambucus racemosa Linn. Sp. Plant. 386. South Island: Romahapa, south of Clutha River, *G. M. Thomson.* (Europe.)

Leycesteria formosa Wall. in Roxb. Fl. Ind. ii, 181; Hook. f. Fl. Brit. Ind. iii, 16. North and South Islands: A garden escape, sometimes spreading widely. Peel Forest, *H. H. Allan.* (Temperate Himalayas.)

VALERIANACEAE.

Centranthus ruber DC. Fl. Fr. iv, 239; Hook. f. Student's Fl. 197. *Spur-valerian.* North and South Islands: A frequent garden escape. (South Europe; West Asia; North Africa.)

Valerianella olitoria Pollich, Hist. Pl. Palat. i, 30; Hook. f. Student's Fl. 197. *Lamb's Lettuce.* North Island: Roadsides and waste places, not uncommon. (Europe; West Asia; North Africa.)

DIPSACACEAE.

Dipsacus sylvestris Mill. Gard. Dict. ed. viii, n. 1; Hook. f. Student's Fl. 199. *Wild Teasel.* North Island: Waste places, not common. (Europe; West Asia; North Africa.)

Scabiosa arvensis Linn. Sp. Plant. 99; Hook. f. Student's Fl. 200. *Field-scabious.* North Island: Fields near Auckland, rare. (Europe; North and West Asia; North Africa.)

Scabiosa maritima Linn. Cent. Plant. ii, 8. North Island: A common garden escape; Mangonui, Bay of Islands, Auckland, Tauranga, &c., *T. F. C.;* Wellington, *T. Kirk!* (South Europe; North Africa.)

CUCURBITACEAE.

Lagenaria vulgaris Ser. in Mem. Soc. Phys. Genev. iii, 25; Hook. f. Fl. Brit. Ind. ii, 613. *Gourd; Hue.* North Island: Brought by the Maoris from Polynesia when they first colonized New Zealand, and still cultivated by them. (Native country uncertain; cultivated everywhere in the tropics.)

Citrullus vulgaris Schrad. ex Eckl. and Zeyh. Enum. 279; Hook. f. Fl. Brit. Ind. ii, 621. *Water-melon.* North Island: Occasionally lingers in old Maori cultivations, but scarcely naturalized. (Tropical Africa; cultivated in all warm countries.)

CAMPANULACEAE.

Campanula Trachelium Linn. Sp. Plant. 166; Hook. f. Student's Fl. 247. North Island: A garden escape near Wellington. (Europe; North and West Asia.)

Jasione montana Linn. Sp. Plant. 1317. North Island: Near source of Mohaka River, *H. Guthrie-Smith!* (Europe.)

COMPOSITAE.

Lagenophora emphysopus Hook. f. Fl. Tasm. i, 189; Benth. Fl. Austral. iii, 508. North and South Islands: Hills near Wellington, *Buchanan! T. Kirk!* Banks Peninsula, *T. Kirk!* (Australia.)

Bellis perennis Linn. Sp. Plant. 886; Hook. f. Student's Fl. 205. *Daisy.* North and South Islands, Stewart Island: Abundant in meadows throughout. (Europe; Asia Minor.)

Calotis lappulacea Benth. in Enum. Pl. Hueg. 60; Fl. Austral. iii, 504: *Glossogyne Hennedyi* R. Brown in Trans. N.Z. Inst. xv (1883) 259. North and South Islands: Poverty Bay, *Bishop Williams!* Nelson, *R. J. Kingsley;* Banks Peninsula, *Brown, T. Kirk!* (Australia.)

Aster imbricatus Linn. Pl. Rar. Afr. 21; Harv. and Sond. Fl. Cap. iii, 77. North Island: Ballast at Wellington, *T. Kirk!* (Cape Colony.)

Aster subulatus Michx. Fl. Bor. Am. ii, 111. North Island: Vicinity of Auckland. (United States.)

Erigeron canadensis Linn. Sp. Plant. 863; Hook. f. Student's Fl. 205. *Canadian Fleabane.* Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Abundant as far south as Canterbury, not common in Otago. (Originally from North America; now almost cosmopolitan.)

Erigeron linifolius Willd. Sp. Plant. iii, 1955; Benth. Fl. Austral. iii, 495. Kermadec Islands, North and South Islands: Abundant in the Auckland Provincial District, rarer southwards to Marlborough and Westport. (Tropics of both hemispheres.)

Erigeron annuus Pers. Ench. ii, 431. North Island: Otukai, Mangonui, *H. Carse!* (North America.)

Vittadinia australis A. Rich. var. *dissecta* Benth. Fl. Austral. iii, 491. South Island: Naturalized in several localities, especially about Nelson. In my opinion, this is totally distinct from the typical *V. australis.* (Australia.)

Stuartina Muelleri Sond. in Linnaea, xxv (1852) 522; Benth. Fl. Austral. iii, 657. South Island: Marlborough, sandy places near the mouth of the Awatere River, *J. H. Macmahon!* Port Hills, near Christchurch, *H. H. Allan.* (Australia.)

Helichrysum cymosum Less. Syn. Comp. 302; Harv. and Sond. Fl. Cap. iii, 245. South Island: Railway embankments near Westport, *W. Townson!* (Cape Colony.)

Gnaphalium purpureum Linn. Sp. Plant. 854; Benth. Fl. Austral. iii, 655. North Island: Not uncommon in drained swamps, freshly cleared lands, &c., from the North Cape to the Upper Waikato, rarer southwards to Wellington. (North America; now naturalized in many parts of the world.)

Xanthium strumarium Linn. Sp. Plant. 987; Benth. Ill. Handb. Brit. Fl. i, 456. *Burweed.* North Island: Roadsides and waste places in Hawke's Bay and Wellington, scarce. (Europe; Central Asia.)

Xanthium spinosum Linn. Sp. Plant. 987; Benth. Fl. Austral. iii. 535. *Bathurst Burr.* North Island: Not uncommon in warm rich soils from the North Cape to the Upper Waikato, rarer southwards to Wellington. (Originally from South America; now naturalized in most warm countries.)

Pascalia glauca Orteg. Hort. Matr. Dec. 39; DC. Prodr. v, 549. North Island: Ballast at Wellington, *T. Kirk.* (Chile.)

Galinsoga parviflora Cav. Ic. iii, 41, t. 281; Hook. f. Student's Fl. 211. North Island: Ballast at Wellington, *T. Kirk.* (South America.)

Madia sativa Molina, Sagg. Chile, ed. i, 136; Wats. Bot. Calif. i, 359. *Tarweed.* South Island: Roadsides and waste places. Renwicktown (Marlborough), *Reader;* south-east Otago, *Petrie! T. Kirk!* (California; Peru; Chile.)

Helenium quadridentatum Labill. in Act. Soc. Hist. Nat. Par. i (1792) 22; DC. Prodr. v. 666. North Island: Waste places at Tapotopoto Bay, North Cape district, *T. F. C.* (North America.)

Achillea millefolium Linn. Sp. Plant. 899; Hook. f. Student's Fl. 212. *Yarrow.* North and South Islands: Fields and roadsides, not uncommon. (Europe; North and West Asia to India; North America.)

Achillea tanacetifolia All. Fl. Pedem. i, 183; DC. Prodr. vi, 25. North and South Islands: Roadsides and waste places, not common. Vicinity of Auckland, *T. F. C.;* Lincoln (near Christchurch), *T. Kirk.* (South Europe.)

Anthemis arvensis Linn. Sp. Plant. 894; Hook. f. Student's Fl. 211. *Corn-chamomile.* North and South Islands: Roadsides and margins of fields, not uncommon. (Europe; West Asia; North Africa.)

Anthemis Cotula Linn. Sp. Plant. 894; Hook. f. Student's Fl. 212. *Stinking Mayweed.* North and South Islands: Roadsides and waste places, not uncommon. (Europe; North and West Asia to India; Canary Islands.)

Anthemis nobilis Linn. Sp. Plant. 894; Hook. f. Student's Fl. 212. *Chamomile.* North and South Islands: An occasional garden escape, rare. (Europe; North Africa.)

Chrysanthemum segetum Linn. Sp. Plant. 889; Hook. f. Student's Fl. 214. *Corn-marigold.* North and South Islands: Cultivated fields, not common. (Europe; West Asia; North Africa.)

Chrysanthemum Parthenium Bernh. Syst. Verz. Erf. 145; Hook. f. Student's Fl. 214. *Fever-few.* North and South Islands: Waste places and roadsides. (Europe.)

Chrysanthemum Leucanthemum Linn. Sp. Plant. 888; Hook. f. Student's Fl. 214. *Ox-eye Daisy.* North and South Islands: An abundant weed in pastures throughout. (Europe; North and West Asia.)

Matricaria discoidea DC. Prodr. vi, 50; Asa Gray Man. 226. North Island: Roadsides in the Auckland Provincial District, abundant. Otaki, *H. H. Allan.* (North America.)

Matricaria Chamomilla Linn. Sp. Plant. 891; Hook. f. Student's Fl. 213. *Wild Chamomile.* North and South Islands: Waste places and cultivated fields, not uncommon. (Europe; North and West Asia.)

Matricaria inodora Linn. Fl. Suec. ii, 765; Hook. f. Student's Fl. 213. North and South Islands: Fields and waste places, abundant. (Europe; North and West Asia.)

Cenia turbinata Pers. Syn. ii, 465; Harv. and Sond. Fl. Cap. iii, 185. North Island: Ballast at Wellington, *T. Kirk.* (Cape Colony.)

Soliva anthemifolia R. Br. in Trans. Linn. Soc. xii (1817) 102; Benth. Fl. Austral. iii, 552. North Island: Alluvial flats by the Northern Wairoa River, *T. F. C.;* Fairburn's (near Mangonui), *H. Carse!* (South America; naturalized in Australia.)

Soliva sessilis Ruiz and Pav. Prodr. 113, t. 24; DC. Prodr. vi, 143. North Island: Waste places in the Lower and Middle Waikato, *T. F. C.;* vicinity of Auckland. (Chile.)

Tanacetum vulgare Linn. Sp. Plant. 844; Hook. f. Student's Fl. 215. *Tansy.* North and South Islands: Waste places, not common. (Europe; North Asia.)

Artemisia Absinthium Linn. Sp. Plant. 848; Hook. f. Student's Fl. 216. *Wormwood.* North and South Islands: Waste places and roadsides, not uncommon. (Europe; North and West Asia; North Africa.)

Senecio vulgaris Linn. Sp. Plant. 867; Hook. f. Student's Fl. 218. *Groundsel.* Kermadec Islands, North and South Islands, Stewart Island: A common weed throughout. (Europe; North Asia; North Africa; and naturalized in all temperate countries.)

Senecio sylvaticus Linn. Sp. Plant. 868; Hook. f. Student's Fl. 218: *S. areolatus* Col. in Trans. N.Z. Inst. xxvi (1894) 317. North and South Islands: Abundant as far south as Canterbury, rare in Otago and Southland. (Europe; North Asia.)

Senecio Jacobaea Linn. Sp. Plant. 870; Hook. f. Student's Fl. 218: *S. dimorphocarpos* Col. in Trans. N.Z. Inst. xxvi (1894) 316. *Ragwort.* North and South Islands: Plentiful in many localities. (Europe; North and West Asia.)

Senecio aquaticus Hill Veg. Syst. ii, 120; Hook. f. Student's Fl. 219. South Island: Buller Valley, *Spencer*. (Europe; North Asia; North Africa.)

Senecio mikanioides Otto ex Walp. in Otto and Dietr. Allg. Gartens, xiii (1845) 42; Harv. and Sond. Fl. Cap. iii, 402. North Island: A common garden escape from Kaitaia and Mangonui to Wellington. South Island: Nelson, *H. H. Allan;* near Dunedin, *G. M. Thomson*. (South Africa.)

Calendula officinalis Linn. Sp. Plant. 921; DC. Prodr. vi, 451. *Marigold*. North and South Islands: A frequent garden escape. (South Europe; West Asia.)

Osteospermum moniliferum Linn. Sp. Plant. 923; Harv. and Sond. Fl. Cap. iii, 436. North Island: An occasional garden escape in the vicinity of Auckland, rare. (South Africa.)

Cryptostemma calendulaceum R. Br. in Ait. Hort. Kew, ed. ii, 141; Harv. and Sond. Fl. Cap. iii, 467. *Cape-weed*. North Island: Pastures and waste places, abundant. (Cape Colony.)

Arctium Lappa Linn. Sp. Plant. 816; Hook. f. Student's Fl. 220. *Burdock*. North and South Islands: Waste places from the East Cape southwards, not uncommon. (Europe; North and West Asia.)

Carduus nutans Linn. Sp. Plant. 821; Hook. f. Student's Fl. 224. *Musk-thistle*. South Island: Eastern Otago, *T. Kirk;* Ashburton, *H. H. Allan*. (Europe; North and West Asia to India; North Africa.)

Carduus pycnocephalus Linn. Sp. Plant. ed. ii, 1151; Hook. f. Student's Fl. 225. *Slender Thistle*. North and South Island: Not uncommon in fields and waste places. (Europe; North Africa.)

Cnicus lanceolatus Willd. Prodr. Fl. Berl. 259; Hook. f. Student's Fl. 225. *Spear Thistle*. North and South Islands, Stewart Island: Abundant throughout. (Europe; North Asia; North Africa.)

Cnicus eriophorus Roth. Tent. Fl. Germ. i, 345; Hock. f. Student's Fl. 225. *Woolly Thistle*. North Island: Upper Wairarapa, *T. Kirk*. (Europe.)

Cnicus arvensis Hoffm. Deutschl. Fl. ed. ii, 130; Hook. f. Student's Fl. 226. *Californian Thistle; Canadian Thistle*. North and South Islands: Cultivated fields; a serious pest in many localities. (Europe; North and West Asia; North Africa.)

Onopordon Acanthium Linn. Sp. Plant. 827; Hook. f. Student's Fl. 227. *Cotton-thistle*. South Island: Ashburton, *W. W. Smith*. (Europe; North Asia.)

Silybum Marianum Gaertn. Fruct. ii, 378, t. 168; Hook. f. Student's Fl. 228. *Milk thistle*. North and South Islands: Fields and waste places, abundant to the north of the East Cape, rarer southwards. (Europe; West Asia to the Caucasus.)

Cynara Cardunculus Linn. Sp. Plant. 827; DC. Prodr. vi, 620. *Cardoon*. North Island: Waste places, not common. Mangonui, *T. F. C.;* Napier, *T. Kirk*. (South Europe).

Centaurea nigra Linn. Sp. Plant. 911; Hook. f. Student's Fl. 222. *Knap-weed*. North and South Islands: Fields and waste places, not common. (Europe.)

Centaurea Calcitrapa Linn. Sp. Plant. 917; Hook. f. Student's Fl. 223. *Star Thistle*. North and South Islands: Fields and waste places, not uncommon. (Europe; West Asia to India.)

Centaurea solstitialis Linn. Sp. Plant. 917; Hook. f. Student's Fl. 223. *Yellow Star Thistle*. North and South Islands: Fields and waste places, not uncommon. (Europe; West Asia; North Africa.)

Cichorium Intybus Linn. Sp. Plant. 813; Hook. f. Student's Fl. 228. *Chicory*. North and South Islands: Roadsides and waste places, not uncommon. (Europe; North and West Asia to India; North Africa.)

Tolpis umbellata Bertol. in Mem. Soc. Emul. Genova, ii (1803) 133; DC. Prodr. vii, 86. North Island: Fields between Panmure and Penrose (Auckland District), near Helensville, *T. F. C.* (South Europe.)

Lapsana communis Linn. Sp. Plant. 811; Hook. f. Student's Fl. 229. *Nipple-wort*. North and South Islands, Stewart Island: Waste places and cultivated fields, abundant. (Europe; North and West Asia to India; North Africa.)

Picris (Helminthia) echioides Linn. Sp. Plant. 792; Hook. f. Student's Fl. 230. *Ox-tongue*. North and South Islands: Fields and waste places, generally distributed. (Europe; North Africa.)

Crepis virens Linn. Sp. Plant. 1134; Hook. f. Student's Fl. 230. North and South Islands, Stewart Island, Chatham Islands: Fields and waste places, common throughout. (Europe; Caucasus; North Africa.)

Crepis foetida Linn. Sp. Plant. 807; Hook. f. Student's Fl. 231. North Island: Fields on the Auckland Isthmus, not common. (Europe; West Asia to the Himalayas; North Africa.)

Crepis taraxacifolia Thuill. Fl. Par. 409; Hook. f. Student's Fl. 231. North Island: Fields and waste places in the Auckland District. (Europe; West Asia; North Africa.)

Crepis setosa Hall. f. in Roem. Archiv. i, 2, 1; Hook. f. Student's Fl. 231. North Island: Waste places on the Auckland Isthmus, not common. (Europe.)

Hypochaeris glabra Linn. Sp. Plant. 810; Hook. f. Student's Fl. 238. *Smooth Catsear.* North and South Islands: Fields, &c., abundant throughout. (Europe; West Asia; North Africa.)

Hypochaeris radicata Linn. Sp. Plant. 810; Hook. f. Student's Fl. 238. *Catsear.* Kermadec Islands, North and South Islands, Stewart Island, Chatham Islands: Abundant in all soils and situations. (Europe; North Africa.)

Leontodon hirtus Linn. Syst. 1194; Hook. f. Student's Fl. 239. *Lesser Hawkbit.* North and South Islands: Fields and waste places, not common. (Europe.)

Leontodon hispidus Linn. Sp. Plant. 799; Hook. f. Student's Fl. 239. *Common Hawkbit.* North and South Islands: Fields and waste places, plentiful in many localities. (Europe.)

Leontodon autumnalis Linn. Sp. Plant. 798; Hook. f. Student's Fl. 239. *Autumnal Hawkbit.* North Island: Fields and waste places from Auckland to Wellington, not common. (Europe; North and West Asia.)

Lactuca saligna Linn. Sp. Plant. 796; Hook. f. Student's Fl. 241. *Willow-lettuce.* North Island: Petane, Hawke's Bay, *A. Hamilton.* (Europe; West Asia; North Africa.)

Lactuca muralis E. Mey. Chlor. Hannov. 431; Hook. f. Student's Fl. 241. *Wall-lettuce.* South Island: Marlborough, *J. H. Macmahon! T. Kirk!* Wangapeka Valley, Nelson, *F. G. Gibbs.* (Europe; North and West Asia.)

Lactuca scariola Linn. Sp. Plant. 1119. North Island: Onehunga, *J. P. Kalaugher!* (Europe.)

Sonchus arvensis Linn. Sp. Plant. 793; Hook. f. Student's Fl. 242. *Corn Sow-thistle.* North Island: Cultivated fields near Auckland, rare. (Europe; West Asia to the Himalayas; North Africa.)

Tragopogon porrifolius Linn. Sp. Plant. 789; Hook. f. Student's Fl. 243. *Salsify.* North and South Islands: Fields and waste places, not common. (Europe; North and West Asia.)

Erechtites Atkinsoniae F. v. M. Fragm. v, 88. North Island: Mongonui County, *H. Carse.* (New South Wales.)

Erechtites valerianaefolia DC. Prodr. vi (1837) 295. North Island: Otukai, *H. Carse.* (Tropical America.)

Hieracium prealtum Gochn. Cich. 17. South Island: Near Peel Forest, *H. H. Allan.* (Europe.)

Hieracium Pilosella Linn. Sp. Plant. 1125. South Island: Hinds River, *H. H. Allan.* (Europe.)

Bidens tripartita Linn. Sp. Plant. 1165. North Island: Near Ohaupo, *A. V. Macdonald!* (Europe; Siberia.)

III. ALPHABETICAL LIST OF MAORI NAMES OF PLANTS.

The following list of Maori plant-names has been compiled from various sources, such as the list given in the appendix to the Handbook, Williams's "New Zealand Dictionary," Mr. Colenso's botanical and ethnographical papers printed in various volumes of the "Transactions of the New Zealand Institute," &c. I particularly desire to acknowledge my indebtedness to the Right Rev. W. L. Williams, Bishop of Waiapu, for a very full and complete catalogue of all Maori plant-names known to him, including a great number not previously published. Bishop Williams's intimate acquaintance with both the Maori language and the botany of New Zealand has made his assistance most valuable, and I feel that any merit which this enumeration possesses is chiefly due to his friendly co-operation. Mr. Percy Smith has also furnished me with many new names and much valuable criticism; while Mr. Elsdon Best has supplied a copious list of plant-names in use in the Urewera country. I have also received assistance from the Rev. F. R. Spencer, R. H. Matthews, F. A. D. Cox, A. Shand, and others, to all of whom my grateful thanks are due.

Ahotea (Elsdon Best). *Phyllocladus trichomanoides.*
Aka (Colenso, Williams, &c.). A general name for the stem of any climbing plant.
Aka (Colenso, Tregear). *Metrosideros scandens.*
Aka (Williams). *Metrosideros florida.*
Aka (Colenso). *Tetrapathaea tetrandra.*
Akakaikiore. *Parsonsia heterophylla* and *P. capsularis.*
Akakaiku. *Tetrapathaea tetrandra.*
Akakaikuku. *Tetrapathaea tetrandra.*
Akakaimanu (Colenso). *Tetrapathaea tetrandra.*
Akakiekie (Williams). Roots of *Freycinetia Banksii.*
Akakior[illegible] (Williams, Tregear). *Parsonsia capsularis.*
Akakoa[illegible]are (Williams). Edible roots of *Typha.*
Akakohia (Colenso). *Tetrapathaea tetrandra.*
Aka-kopu-kereru (Elsdon Best). *Clematis* sp.
Akakuku (Williams). *Tetrapathaea tetrandra.*
Akakura (E. B. Dickson). *Metrosideros diffusa.*
Akakura (Williams). *Metrosideros florida.*
Aka-ngakau-kiore (Elsdon Best). *Clematis parviflora.*
Aka-o-tuwhenua (Elsdon Best). Rhizome of *Pteridium aquilinum.*
Akapirita (Williams). *Rhipogonum scandens.*
Akapita (Colenso). *Rhipogonum scandens.*
Akapohue (Colenso). *Calystegia sepium.*
Akarewa (Williams). Cultivated variety of *Colocasia antiquorum.*
Akatawhiwhi (Williams, Tregear). *Metrosideros florida.*
Akatea (Williams, Tregear). *Metrosideros albiflora.*
Akatorotoro (Colenso). *Metrosideros scandens.*
Ake (Colenso, Williams). *Dodonaea viscosa.*
Akeake (Colenso, Williams). *Dodonaea viscosa.*
Akeake (Colenso, Hector). *Olearia avicenniaefolia.*
Akeake (G. Mair). *Olearia Traversii.*
Akepirau (Tregear). *Olearia Forsteri.* Probably the same as Akepiro.
Akepiro (Colenso, Williams). *Olearia furfuracea.*
Akerautangi (Colenso, Mantell). *Dodonaea viscosa.*
Akewharangi (Colenso). *Olearia Cunninghamii.*
Akiraho (Williams). *Olearia Forsteri.*
Amaru (Williams). *Metrosideros florida.*
Amoka (Williams). *Podocarpus totara.*
Angiangi (Williams). *Usnea barbata.*

Angiangi (Williams, Tregear). *Coprosma Baueri.*
Anurangi (Williams). Cultivated variety of *Ipomoea batatas.*
Aoanga, Aohanga (Colenso). *Phormium tenax* (variegated variety).
Aorangi (Williams). Striped variety of *Phormium tenax.*
Arorangi (Elsdon Best). *Olearia macrodonta.*
Aruhe (Colenso, Williams). Rhizome of *Pteridium aquilinum.*
Atemango (Williams). Variety of *Phormium tenax.*
Ateraukawa (Williams). Variety of *Phormium tenax.*
Atewheke (Williams). Variety of *Phormium tenax.*
Atewheki (Williams). *Dicksonia squarrosa.*
Aute (Colenso, Williams, &c.). *Broussonetia papyrifera.*
Aute (R. H. Matthews). *Veronica diosmaefolia.*
Autetaranga (Colenso, Tregear). *Pimelea arenaria.*
Autetauranga (Colenso). *Pimelea arenaria.*
Awanga (Colenso). Cultivated variety of *Colocasia antiquorum.*
Awanga (Percy Smith). Variegated variety of *Phormium tenax.*
Awhato, or Awheto (Colenso, Williams). The so-called vegetable caterpillar, *Cordyceps Robertsii.*

Eketera (D'Urville). *Lepidium oleraceum.*
Emiemi (Tregear). *Dracophyllum latifolium.*
Ewekuri (Williams). *Paratrophis heterophylla.*

Haekaro (Tregear). *Pittosporum umbellatum.*
Haka (Williams). *Erigeron canadensis.*
Hakeka, Hakekakeka (Elsdon Best). A fungus, *Hirneola polytricha.*
Hakeke (Williams). A fungus, *Hirneola polytricha.*
Hakeke (Williams). *Olearia ilicifolia.*
Hakekeke (Elsdon Best). A fungus, *Hirneola polytricha.*
Hamo (Williams). Cultivated variety of *Ipomoea batatas.*
Hanea (Williams). *Nasturtium palustre.*
Hangatare (F. A. D. Cox). *Olearia semidentata.*
Hangehange (Colenso, Williams, &c.). *Geniostoma ligustrifolium.*
Harakeke (Colenso, Williams, &c.). *Phormium tenax.*
Harapere (F. A. D. Cox). *Phormium tenax.*
Harareke (Colenso, Williams). *Phormium tenax.*
Harore (Williams). A fungus, *Agaricus adiposus.*
Harore (Elsdon Best). A general term for fungi.
Hauama (Colenso, Williams). *Entelea arborescens.*
Haukopa (Colenso). Cultivated variety of *Colocasia antiquorum.*
Haumakoroa (Williams, Traill). *Nothopanax simplex.*
Haumangoroa (Williams). *Nothopanax simplex* and *N. Edgerleyi.*
Haumata (Elsdon Best). Snow-grass.
Hauora (Williams). *Cordyline Banksii.*
Hawato (Williams). The vegetable caterpillar, *Cordyceps Robertsii.*
Hawere (Colenso). Cultivated variety of *Ipomoea batatas.*
Heka-ponga (Williams). Gum of Tree-fern.
Heketara (Williams). *Olearia Cunninghamii.*
Hengahenga (Williams). *Geniostoma ligustrifolium.*
Heruheru (Colenso, Williams). *Leptopteris hymenophylloides* and *L. superba.*
Hinahina (Hector, Williams). *Melicytus ramiflorus.*
Hinarepe (Elsdon Best). *Festuca littoralis.*
Hinau (Yate, Cunningham, Colenso, &c.). *Elaeocarpus dentatus.*
Hine-kaikomako (Williams). *Pennantia corymbosa.*
Hingongi (Williams). Cultivated variety of *Solanum tuberosum.*
Hioi (Williams). *Mentha Cunninghamii.*
Hitara (Colenso). Cultivated variety of *Ipomoea batatas.*
Hiwai (Williams). A general name for *Solanum tuberosum.*
Hohere (Cunningham, Colenso, &c.). *Hoheria populnea.* Probably more correctly spelt Houhere.
Hohere (Lyall). *Gaya Lyallii.*
Hoho (F. A. D. Cox). *Pseudopanax chathamicum.* Probably should be Houhou.
Hohoeka (Lyall, Williams). *Pseudopanax crassifolium.*
Hoihere (Colenso, Williams). *Hoheria populnea.*

Hokataka (F. A. D. Cox). *Corokia macrocarpa.*
Hokeke (Elsdon Best). *Hirneola polytricha.*
Hokokuku (Elsdon Best). *Clematis* sp.
Homanoroa (Elsdon Best). *Nothopanax Edgerleyi.* Possibly should be Houmanoroa.
Hona (Elsdon Best). Fruit of *Fuchsia excorticata.*
Horahora (Elsdon Best). *Astelia Banksii.*
Horeto (Williams). Ripe fruit of *Solanum aviculare.*
Horoeka (Polack, Cunningham, Colenso). *Pseudopanax crassifolium.*
Horokaka (Williams). *Mesembryanthemum australe.*
Horokawa (Elsdon Best). A bulrush.
Horokio (Williams). *Blechnum capense.*
Horopito (Colenso, Williams). *Drimys axillaris.*
Horopito (R. H. Matthews). *Alseuosmia macrophylla.*
Houama (Williams). *Entelea arborescens.*
Houhere (Colenso, Williams). *Hoheria populnea.*
Houhi (Williams, Elsdon Best). *Hoheria populnea.*
Houhi puruhi (Elsdon Best). *Hoheria angustifolia.*
Houhou (Williams, Elsdon Best). *Nothopanax arboreum.*
Houi (Colenso). *Hoheria populnea.*
Houi (Traill). *Plagianthus betulinus.*
Houka (Hector). *Cordyline australis.* Doubtless a misspelling for Kouka.
Houkumara (Williams). *Melicope ternata.*
Houma (Hector, Tregear). *Sophora tetraptera.*
Houmangaroa (Williams). *Nothopanax Edgerleyi.*
Houmapara (Williams). *Pseudopanax Lessonii.*
Houpara (Williams). *Pseudopanax Lessonii.*
Houparapara (Williams). *Pseudopanax Lessonii.*
Hua inanga (Elsdon Best). *Chenopodium album.*
Huamango (Williams). Cultivated variety of *Solanum tuberosum.*
Huarangi (Williams). Fruit of *Dacrydium cupressinum.*
Huarua (Elsdon Best). Seeds of *Coriaria ruscifolia.*
Hue (Colenso, Williams). *Lagenaria vulgaris.* Also a general name for all gourds.
Hue-o-Raukatauri (Elsdon Best). *Ourisia macrophylla.*
Huiupoko (Williams). Cultivated variety of *Ipomoea batatas.*
Hukihuki (Williams). *Coprosma tenuicaulis.*
Hukihukiraho (Williams). *Cyathodes acerosa* and *Leucopogon fasciculatus.*
Hunangamoho (Colenso). *Stipa arundinacea.*
Hunangamoho (Williams). *Danthonia Cunninghamii.*
Hune (Colenso, Williams). Feathery seeds of *Typha.*
Hungere (Williams). Small-leaved variety of *Hoheria populnea.*
Huperei (Elsdon Best). *Gastrodia Cunninghamii.*
Hupirau-ririki (Williams). *Coprosma foetidissima.*
Hupiro (Colenso). *Coprosma foetidissima.*
Huruhura-hika (Elsdon Best). Var. of *Phormium tenax.*
Huruhuru-o-Hine-nui-te-po (Elsdon Best). *Acaena sanguisorbae.*
Huruhuru-o-nga-waewae-o-Paoa (Williams). *Leptopteris superba.*
Huruhuru-tapairu (Elsdon Best). *Adiantum* sp.
Huruhuruwhenua (Williams). *Asplenium lucidum.*
Hutihuti (Williams). Cultivated variety of *Ipomoea batatas.*
Hutiwai (Lyall, Williams). *Acaena sanguisorbae.*
Hutu (Colenso). *Nothofagus fusca.*
Hutu (Hector). *Ascarina lucida.*
Hutukawa (Williams). *Metrosideros tomentosa.*
Hututawai (Elsdon Best). *Nothofagus fusca.*

Ihupuku (Williams). Cultivated variety of *Ipomoea batatas.*
Ikaika (Williams). *Orthoceras Solandri.*
Inaka (Traill). *Dracophyllum longifolium.*
Inakaporiro (Williams). *Cyathodes acerosa.*
Inanga (Elsdon Best). *Dracophyllum longifolium.*
Inangaporiro (Williams). *Cyathodes acerosa.*
Inihina (A. Shand). *Melicytus ramiflorus.* Chatham Island. "Probably should be Inaina," Percy Smith.
Irirangi (Elsdon Best). *Hymenophyllum demissum* and *H. dilatatum.*
Iwituna (Elsdon Best). *Lycopodium Billardieri.*

Kahakaha (Williams). *Astelia Cunninghamii.*
Kahakaha (Colenso, Williams). *Astelia Solandri.*
Kahia (Williams). *Tetrapathaea tetrandra.*
Kahika (Williams). *Podocarpus dacrydioides.*
Kahikahika (Williams). *Metrosideros florida.*
Kahikatea (Yate, Cunningham, Colenso, &c.). *Podocarpus dacrydioides.*
Kahikatoa (Yate, Colenso, Williams). *Leptospermum scoparium.*
Kahikawaka (Williams). *Libocedrus Doniana.*
Kahikomako (Colenso, Williams). *Pennantia corymbosa.*
Kaho (Cunningham). *Linum monogynum.*
Kahoho (Williams). Fruit of *Solanum aviculare.*
Kahuorangi (Williams). Cultivated variety of *Colocasia antiquorum.*
Kai (Williams). *Podocarpus spicatus.*
Kaia (Williams). *Acaena sanguisorbae.*
Kaiarurerure (Elsdon Best). *Acaena sanguisorbae.*
Kaihua (Williams). *Parsonsia heterophylla.*
Kaihuia (Williams). *Rhopalostylis sapida.*
Kaikaia (Percy Smith). *Acaena sanguisorbae.*
Kaikaiaruhe (Percy Smith). *Acaena sanguisorbae.*
Kaikaiarure (Elsdon Best). *Acaena sanguisorbae.*
Kaikaiatua (Williams). *Rhabdothamnus Solandri.*
Kaikaiatua (Williams). *Leucopogon fasciculatus.*
Kaikaka (Colenso). Cultivated variety of *Ipomoea batatas.*
Kaikaro (Colenso). *Pittosporum crassifolium.*
Kaikaro (Percy Smith). *Pittosporum tenuifolium.*
Kaikatea (Polack, &c.). *Podocarpus dacrydioides.* Evidently a misspelling of Kahikatea.
Kaikawaka (Colenso). *Libocedrus Doniana.*
Kaikomako (Colenso, Williams). *Pennantia corymbosa.*
Kaiku (Colenso). *Parsonsia capsularis.*
Kaimanu (Williams). *Tetrapathaea tetrandra.*
Kaingarua (Elsdon Best). *Erigeron canadensis.*
Kairorowhare (Colenso). Cultivated variety of *Ipomoea batatas.*
Kaiweta (Percy Smith). *Melicytus lanceolatus.*
Kaiweta (Williams). *Carpodetus serratus.*
Kaiwhiria (Colenso). *Hedycarya arborea.*
Kaiwhiria (Williams). *Parsonsia capsularis.*
Kaiwiria (Hector). *Nothopanax simplex.*
Kakaha (Hector). *Astelia nervosa.*
Kakaho (Colenso, Williams). Culms of *Arundo conspicua.*
Kakai (Elsdon Best). Young form of *Podocarpus spicatus.*
Kakaka (Williams). Stem of *Pteridium aquilinum.*
Kakaramea (Williams). Scent prepared from *Aciphylla squarrosa.*
Kakaramu (Williams). *Coprosma robusta* and *C. lucida.*
Kakarangu (Williams). *Coprosma robusta.*
Kakareao. *Rhipogonum scandens.*
Kakarewao (Elsdon Best). *Rhipogonum scandens.*
Kakatarahae (Colenso). Cultivated variety of *Ipomoea batatas.*
Kakatarahae (Williams). Cultivated variety of *Colocasia antiquorum*
Kama (Williams). *Gualtheria oppositifolia.*
Kamahi (Williams). *Weinmannia racemosa.*
Kamu (Elsdon Best). *Uncinia australis.*
Kamu (Williams). *Bidens pilosa.*
Kanawa (Colenso). Cultivated variety of *Ipomoea batatas.*
Kanga (Williams). *Zea mays.*
Kanono (Williams). *Coprosma grandifolia.*
Kanuka (Williams). *Leptospermum ericoides.*
Kaoho (Elsdon Best). Fruiting specimens of *Solanum aviculare.*
Kapana (Williams). A general name for *Solanum tuberosum.*
Kapara (Williams). Resin of *Podocarpus dacrydioides.*
Kapia (Colenso, &c.). Resin of *Agathis australis.*
Kaponga (Williams). *Cyathea dealbata.*
Kapuka (Traill, Williams). *Griselinia littoralis.*
Kapu (Williams). *Cordyline Banksii.*
Kapukiore (Williams). *Coprosma grandiflora.*
Kapungawha (Williams). *Scirpus lacustris.*

Karaka (Cunningham, Colenso, Williams, &c.). *Corynocarpus laevigata.*
Karamea (Williams). *Aciphylla squarrosa.*
Karamu (Colenso, Williams). *Coprosma robusta* and *C. lucida.*
Karamu (Colenso). *Coprosma foetidissima.*
Karamu-kueo (Elsdon Best). *Coprosma grandifolia.*
Karamuramu (Williams). *Coprosma robusta.*
Karangu (Colenso, Williams). *Coprosma robusta* and *C. lucida.*
Karapapa (Williams). *Alseuosmia macrophylla.*
Kareao (Colenso, Williams). *Rhipogonum scandens.*
Karearea (Elsdon Best). *Lemna minor.*
Karepo (Elsdon Best). *Zostera nana.*
Karerarera (Williams). *Azolla rubra.*
Karetu (Colenso, Williams). *Hierochloe redolens.*
Karewao (Elsdon Best). *Rhipogonum scandens.*
Karewao (Hector). *Rhipogonum scandens.*
Karito (Lyall, Williams). *Typha angustifolia.*
Karo (Colenso, Williams). *Pittosporum crassifolium.*
Karo (Colenso). *Pittosporum cornifolium.*
Katea (Williams). *Podocarpus dacrydioides.*
Katoa (Williams). *Leptospermum scoparium.*
Katote (Williams). *Hemitelia Smithii.*
Katote (Percy Smith). *Cyathea dealbata.*
Katoto (Williams). Cultivated variety of *Ipomoea batatas.*
Kauere (Colenso, Williams). *Vitex lucens.*
Kauhangaroa (Williams). *Phormium tenax.*
Kauka (Tregear). *Cordyline australis.*
Kauparerarera (Elsdon Best). *Plantago spathulata.*
Kauri (Yate, Polack, Cunningham, &c.). *Agathis australis.*
Kautara (Elsdon Best). *Sonchus asper.*
Kauto, Kautowhau (Colenso). Cultivated varieties of *Ipomoea batatas.*
Kawa (Williams). *Macropiper excelsum.*
Kawaka (Yate, Cunningham, Colenso, &c.). *Libocedrus Doniana.*
Kawakawa (Colenso, Williams). *Macropiper excelsum.*
Kawakawa (Colenso, Williams). Cultivated variety of *Ipomoea batatas.*
Kawakawa (Elsdon Best). *Blechnum fluviatile.*
Kawakawa-tawhiti (Colenso). Cultivated variety of *Ipomoea batatas.*
Kawariki (Williams). *Coprosma grandifolia.*
Kawau (Williams). Cultivated variety of *Ipomoea batatas.*
Keha (Williams). *Brassica campestris.*
Keka (Williams). *Hirneola polytricha.*
Kekeke (Elsdon Best). *Hirneola polytricha.*
Kekereao (Elsdon Best). *Rhipogonum scandens.*
Keketerehe (F. A. D. Cox). *Olearia Chathamica.*
Kengo (Colenso). Cultivated variety of *Ipomoea batatas.*
Kiekie (Colenso, Williams, &c.). *Freycinetia Banksii.*
Kihihi (Williams). *Pittosporum crassifolium.*
Kihihi (Williams). *Pittosporum eugenoides.*
Kinakina (Colenso). Cultivated variety of *Colocasia antiquorum.*
Kiokio (Williams, Elsdon Best). *Blechnum capense.*
Kiokiorangi (Colenso). Cultivated variety of *Ipomoea batatas.*
Kirikaraka (Williams). Cultivated variety of *Ipomoea batatas.*
Kiwikiwi (Elsdon Best). *Blechnum fluviatile.*
Koare (Williams). *Nothopanax Edgerleyi.*
Koare (Lindsay). *Typha angustifolia.*
Koareare (Williams). *Nothopanax Edgerleyi.*
Koareare (Williams). Rhizome of *Typha angustifolia.*
Koareare (Colenso). Cultivated variety of *Colocasia antiquorum.*
Koeata (Williams). Young shoots of *Pteridium aquilinum.*
Koeka (Elsdon Best). *Pseudopanax crassifolium.*
Kohe (Williams). *Tetrapathaea tetrandra.*
Kohe (Williams). *Dysoxylum spectabile.*
Kohekohe (Yate, Colenso, &c.). *Dysoxylum spectabile.*
Kohepi (Williams). Flowers of *Dysoxylum spectabile.*
Kohepiro (Williams). *Angelica rosaefolia.*
Koheriki (Colenso, Williams). *Angelica rosaefolia.*

Koheriki (Cunningham, Williams). *Bidens pilosa.*
Koheriki (Percy Smith). *Melicope ternata.*
Kohi (Hector). *Schefflera digitata.*
Kohia (Colenso, Williams). *Tetrapathaea tetrandra.*
Kohoho (Colenso, Williams). *Solanum aviculare.*
Kohuhu (Colenso). *Pittosporum tenuifolium.*
Kohukohu (Colenso). *Pittosporum tenuifolium.*
Kohukohu (Lindsay). *Stellaria media.*
Kohukohu (Cunningham). *Scleranthus biflorus.*
Kohukohu (Percy Smith). A general name for Moss.
Kohuorangi (Colenso). Cultivated variety of *Colocasia antiquorum.*
Kohuorangi (Williams). *Tupeia antarctica.*
Kohurangi (Williams). Cultivated variety of *Colocasia antiquorum.*
Kohurangi (Williams). *Senecio Kirkii.*
Kohutuhutu (Colenso). *Fuchsia excorticata.*
Kohuwai (Elsdon Best). *Tyndaridea anomala.*
Koihu (Williams). *Pittosporum tenuifolium.*
Kokaha (Elsdon Best). *Astelia Cunninghamii.*
Kokaho (Handbook). *Arundo conspicua.* Doubtless a misspelling for Kakaho.
Kokihi (Colenso, Williams). *Tetragonia expansa* and *T. trigyna.*
Kokirikiri-whetu (Elsdon Best). *Ileodictyon cibarium.*
Kokoeka (Williams). *Pseudopanax crassifolium.*
Kokohurangi (Williams). *Senecio Kirkii.*
Kokomuka (Colenso, Williams). *Veronica salicifolia.*
Kokomuka-taranga (Williams). *Veronica parviflora.*
Kokorangi (Williams). Cultivated variety of *Ipomoea batatas.*
Kokoromiko (Williams). *Veronica salicifolia.*
Kokoromuka (Williams). *Veronica salicifolia.*
Kokotaika (Williams). *Alseuosmia macrophylla.*
Komeke (Williams). Rhizome of *Pteridium aquilinum* prepared for eating.
Komingiroa (Williams). *Senecio Kirkii.*
Konehu (Williams). Cultivated variety of *Ipomoea batatas.*
Konehu-raupo (Williams). Pollen of *Typha.*
Konene (R. H. Matthews). Fruit of *Cassytha paniculata.*
Kongungu (Williams). Small tubers of *Ipomoea batatas.*
Konini (Lyall, Williams). Fruit of *Fuchsia excorticata.*
Kopakipaki (Williams). *Zea mays.*
Kopakopa (Elsdon Best, Tregear). *Trichomanes reniforme.*
Kopakopa (Tregear). *Myosotidium nobile.*
Kopakopa (Williams). *Plantago* spp.
Kopata (Lyall). *Pelargonium australe.*
Kopata (Colenso). *Geum urbanum.*
Kopi (Tregear). *Corynocarpus laevigatus.* Chatham Islands.
Kopi (Polack). Fruit of *Corynocarpus* after steaming.
Kopia (Williams). Kernels of *Corynocarpus* prepared for eating.
Kopoti (Percy Smith). *Anisotome aromatica.*
Kopuka (Williams). *Leptospermum ericoides.*
Kopukapuka (Williams). *Myosotidium nobile.*
Kopukapuka (Elsdon Best). *Ranunculus hirtus.*
Kopungawha (Percy Smith). Several species of *Juncus.*
Kopupu (D'Urville). *Scirpus lacustris.*
Kopupungawha (Williams, E. B. Dickson). *Scirpus lacustris.*
Kopupungawha (E. B. Dickson). Several species of *Juncus.*
Kopupungawha (Lindsay). *Typha angustifolia.*
Kopura (Elsdon Best). Tap-root of *Cordyline.*
Kopura-whetu (Elsdon Best). *Ileodictyon cibarium.*
Korari (Colenso). Scape of *Phormium tenax* and *P. Colensoi.*
Korari (Williams). *Phormium tenax* (the whole plant).
Korari-tuauru (Elsdon Best). *Phormium Colensoi.*
Korau (Colenso, Williams). *Cyathea medullaris.*
Korau (Williams). *Brassica campestris.*
Koreherehe (Colenso, Williams). Cultivated variety of *Ipomoea batatas.*
Koreirei (Colenso, Williams). Rhizome of *Typha.*
Korikori (Tregear). *Ranunculus insignis.*
Korito (Elsdon Best). Young shoots of plants.
Korito (Percy Smith). Young shoots of *Typha angustifolia.*

Koro (Williams). *Metrosideros scandens.*
Koroi (Colenso, Williams). Fruit of *Podocarpus dacrydioides.*
Korokio (Colenso, Williams). *Corokia buddleoides.*
Korokio (H. C. Field). *Blechnum capense* and *B. vulcanicum.*
Korokio-taranga (Cunningham, Colenso). *Corokia buddleoides.*
Korokoro-whetu (Elsdon Best). *Ileodictyon cilarium.*
Koromiko (Colenso, Williams). *Veronica salicifolia* and allied species.
Koromiko-taranga (Colenso). *Veronica parviflora.*
Koromiko-taranga (Williams). *Pimelea longifolia.*
Koromuka (Colenso, &c.). *Veronica salicifolia* and allied species.
Koropiu (Percy Smith). *Blechnum capense.*
Koropuka (Williams). Variety of *Gaultheria antipoda.*
Koru (Williams). *Colensoa physaloides.*
Korukoru (Williams). *Elytranthe Colensoi* when in flower.
Kotau (Elsdon Best). Young shoots of ferns, tutu, &c.
Kotau (Williams). Young shoot of *Rhipogonum scandens.*
Kotete (Williams). *Schefflera digitata.*
Kotipo (Williams). Cultivated variety of *Solanum tuberosum.*
Kotukutuku (Colenso, Williams). *Fuchsia excorticata.*
Kouka (Lindsay). *Cordyline australis.*
Kouka (Williams). Rhizome of *Typha.*
Kouka tarariki (Elsdon Best). Narrow-leaved variety of *Cordyline australis.*
Kouka wharanui (Elsdon Best). Broad-leaved variety of *Cordyline australis.*
Kowaowao (Williams). *Polypodium diversifolium.*
Kowhai (Colenso, Williams). *Sophora* sp.
Kowhai (Elsdon Best). *Geum urbanum.*
Kowhai-taepa (Elsdon Best). Drooping variety of *Sophora.*
Kowhai-tauiti (Elsdon Best). Variety of *Sophora.*
Kowhaikura (Williams). *Potentilla anserina.*
Kowhaingutukaka (Cunningham, Colenso, &c.). *Clianthus puniceus.*
Kowhangatara (E. B. Dickson). *Spinifex hirsutus.*
Kowharawhara (Colenso, Williams). *Astelia Cunninghamii* and *A. Banksii.*
Kowhitiwhiti (Lindsay). *Nasturtium officinale.*
Kowhiwhi (Williams). *Pittosporum tenuifolium.*
Kueo (Elsdon Best). Berries of *Coprosma grandifolia.*
Kukuku (Williams). *Cyathodes acerosa.*
Kukuraho (Williams). *Scirpus maritimus.*
Kumara (Polack, Cunningham, &c.). *Ipomoea batatas.*
Kumarahou (Colenso, Williams). *Pomaderris elliptica.*
Kumarahou (R. H. Matthews). *Pomaderris Edgerleyi.*
Kumarahou (Williams). *Quintinia serrata.*
Kumarahou (Elsdon Best). *Angelica rosaefolia.*
Kumarahou (Elsdon Best). *Olearia Colensoi.*
Kumara-kai-torouka (Williams). *Olearia furfuracea.*
Kupapa (Cunningham). *Tetrapathaea tetrandra.*
Kuranuipaka (Williams). *Dicksonia fibrosa.*
Kurarangi (Colenso). Cultivated variety of *Ipomoea batatas.*
Kurawaka (Percy Smith). Capsule of *Phormium tenax.*
Kurikuri (Lyall). *Aciphylla squarrosa* and *A. Colensoi.*
Kuripaka (Williams). *Dicksonia fibrosa.*
Kuwawa (Elsdon Best). *Scripus lacustris.*
Kuta, Kukuta, Kutakuta (Elsdon Best). *Scirpus lacustris.*

Maakoako (Elsdon Best). *Samolus repens.*
Mahetau (Williams). *Solanum tuberosum.*
Mahimahi (Colenso, Williams). *Elaeocarpus Hookerianus.*
Mahoe (Yate, Cunningham, Colenso). *Melicytus ramiflorus.*
Mahoe (F. A. D. Cox). *Hymenanthera Chathamica.*
Mahoewao (Williams). *Melicytus lanceolatus.*
Mahonge (Williams). A cultivated variety of *Cordyline.*
Mahunu (Williams). Young shoots of *Pteridium aquilinum.*
Mahuri (Raoul). *Alternanthera sessilis.*
Mai (Cunningham, Williams). *Podocarpus spicatus.*
Maihiihi (Elsdon Best). *Griselinia littoralis.*

Maikaika (Colenso). *Orthoceras strictum.*
Maikaika (Lyall). *Thelymitra pulchella.*
Maikaika (Elsdon Best). *Microtis unifolia.*
Maikaika (Colenso). *Arthropodium cirrhatum.*
Maikuku (Percy Smith). *Thelymitra longifolia.*
Maikuku-moa (Elsdon Best). *Leptopteris* sp.
Maire (Colenso, Williams). *Olea Cunninghamii* and *O. lanceolata.*
Maire (Colenso, Williams). *Fusanus Cunninghamii.*
Mairehau (Colenso). *Phebalium nudum.*
Maireire (Williams). *Phebalium nudum.*
Maire-kotae (Elsdon Best). *Olea montana.*
Maire-raunui (Colenso). *Olea Cunninghamii.*
Maire-raunui (Elsdon Best). *Olea lanceolata.*
Maire-rau-riki (Elsdon Best). *Olea lanceolata* and *O. montana.*
Maire-roro (Elsdon Best). *Olea montana.*
Maire-taiki (Elsdon Best). *Fusanus Cunninghamii.*
Mairetawhake (Colenso, Williams). *Eugenia maire.*
Makaka (Williams). *Plagianthus divaricatus.*
Makaka (Williams). *Lygodium articulatum.*
Makaka (Williams). *Carmichaelia* (of several species).
Makaka (Hector). *Carmichaelia australis.*
Makaka (Tregear). *Ackama rosaefolia.*
Makakaka (Williams). *Polygonum aviculare.*
Makakauri (Williams). Cultivated variety of *Ipomoea batatas.*
Makamaka (Elsdon Best). *Ackama rosaefolia.*
Makatiti (Williams). Cultivated variety of *Colocasia antiquorum.*
Makawe (Williams). *Asplenium flaccidum.*
Makawe-tapairu (Elsdon Best). *Adiantum* sp.
Makomako (Cunningham, Colenso, &c.). *Aristotelia racemosa.*
Makora (F. A. D. Cox). *Olearia semidentata.*
Makura (Elsdon Best). *Carex teretiuscula.*
Makururangi (Colenso). Cultivated variety of *Ipomoea batatas.*
Makutu (Williams). Cultivated variety of *Ipomoea batatas.*
Mamaika (Williams). *Orthoceras strictum.*
Mamaku (Colenso, Williams, &c.). *Cyathea medullaris.*
Mamaku (Colenso). Cultivated variety of *Colocasia antiquorum.*
Mamangi (Williams). *Coprosma Baueri.*
Mamangi (E. B. Dickson). *Coprosma arborea.*
Manakura (Williams). *Melicytus micranthus.*
Manamana (Williams). *Asplenium bulbiferum.*
Manatu (Williams). *Plagianthus betulinus.*
Manawa (Cunningham, Colenso, &c.). *Avicennia officinalis.*
Manehu (Williams). *Pteridium aquilinum.*
Mangahuripapa (Elsdon Best). *Libertia ixioides.*
Mangeao (Colenso, Williams). *Litsaea calicaris.*
Mangemange (Colenso, Williams). *Lygodium articulatum.*
Mania (Williams). *Carex lucida.*
Manihi (Williams). *Potamogeton natans* and *P. Cheesemanii.*
Manoao (Colenso). *Dacrydium Colensoi.*
Manono (Williams). *Coprosma grandiflora.*
Manuka (Colenso, Williams, &c.). *Leptospermum scoparium.*
Manukarauriki (Colenso). *Leptospermum ericoides.*
Maomao (Colenso). Cultivated variety of *Ipomoea batatas.*
Maomao (Williams). A variety of *Phormium tenax.*
Maota (Williams). *Dysoxylum spectabile.*
Mapara (Colenso). Heart-wood of *Dacrydium cupressinum.*
Mapara (Elsdon Best). Heart-wood of *Podocarpus dacrydioides.*
Mapara (Williams). Resin of white-pine and other *Taxaceae.*
Mapau (Colenso, Williams). *Myrsine Urvillei.*
Mapauriki (Cunningham). *Pittosporum tenuifolium.*
Mapere (Williams). *Gahnia setifolia.*
Mapou (Williams). *Suttonia australis.*
Mapua (Colenso). Cultivated variety of *Ipomoea batatas.*
Maramawhiti (Colenso). Cultivated variety of *Ipomoea batatas.*
Maratata (Williams). *Polypodium diversifolium.*
Marere (Williams). Variety of *Ipomoea batatas* used in the ceremony of "*pure.*"

Mariri (Williams). Unripe fruit of *Beilschmiedia Tawa*.
Marohi (Williams). Rhizome of *Pteridium aquilinum*.
Maru (Williams). *Leptospermum ericoides*.
Maru (Colenso, Williams). *Sparganium antipodum*.
Maruru (Elsdon Best). *Ranunculus hirtus*.
Mata (Williams). *Carex teretiuscula*.
Matai (Yate, Colenso, Williams, &c.). *Podocarpus spicatus*.
Mataira (F. A. D. Cox). *Suttonia australis*. Chatham Islands.
Matakauri (Colenso, Williams). Cultivated variety of *Ipomoea batatas*.
Matamatahuia (Williams). *Linum monogynum*.
Matangoa (Hugel). *Nasturtium stylosum*.
Matata (Williams). *Rhabdothamnus Solandri*.
Matata (Elsdon Best). *Paesia scaberula* and *Histiopteris incisa*.
Matatiti (Colenso). Cultivated variety of *Colocasia antiquorum*.
Matau (Elsdon Best). *Uncinia* spp.
Matau-a-Maui (Williams). *Uncinia australis*.
Matauririki (Elsdon Best). *Uncinia leptostachya* and *U. riparia*.
Matawaiwai (Williams). Cultivated variety of *Ipomoea batatas*.
Mati (Tregear). Fruit of *Fuchsia excorticata*.
Matiatia (Williams). *Festuca littoralis*.
Matihetihe (Williams). *Festuca littoralis*.
Matipou (Lyall, Williams). *Suttonia australis*.
Matou (Williams). Fruit of *Drimys axillaris*.
Matuakumara (Colenso). *Geranium dissectum*.
Matuamauku (Elsdon Best). *Hymenophyllum dilatatum*.
Matuatikumu (Williams). *Celmisia* sp.
Matukuroimata (R. H. Matthews). *Alseuosmia quercifolia*, *A. Banksii*, and *A. linearifolia*.
Matukutuku (Williams). *Lycopodium* sp.
Maukoro (Lindsay, Williams). *Carmichaelia flagelliformis*.
Mauku (Williams). *Cordyline pumilio*.
Mauku (Williams). *Hymenophyllum* spp.
Mauku (Elsdon Best). *Asplenium bulbiferum*.
Maukuuku (Williams). *Gastrodia Cunninghamii*.
Maurea (Williams). *Carex lucida* and *C. comans*.
Mauri (Elsdon Best). *Astelia* sp.
Mauri (Williams). Totara timber of dark colour.
Mawe (Elsdon Best). *Galium umbrosum*.
Mawhai (Colenso, Williams). *Sicyos angulatus*.
Mawhai (R. H. Matthews). *Cassytha paniculata*.
Meke (Williams). Rhizome of *Pteris aquilina*.
Mengirangi (Colenso). Cultivated variety of *Ipomoea batatas*.
Mihimihi (Williams). *Persoonia toru*.
Miki (Elsdon Best). *Cyathodes acerosa*.
Mikimiki (Williams). *Cyathodes acerosa*.
Miko (Williams). *Rhopalostylis sapida*.
Mikoikoi (Percy Smith). *Libertia ixioides*.
Mingi (Lindsay). *Coprosma propinqua*.
Mingi (Colenso). *Cyathodes acerosa* and *Leucopogon fasciculatus*.
Mingimingi (Williams). *Coprosma Cunninghamii*.
Mingimingi (Williams). *Coprosma propinqua*.
Mingimingi (Lindsay, Williams). *Cyathodes acerosa* and *Leucopogon fasciculatus*.
Miro (Yate, Cunningham, Colenso, &c.). *Podocarpus ferrugineus*.
Moeahu (Williams). *Melicytus ramiflorus*.
Mohani, Moheke (Williams). Rhizome of *Pteridium aquilinum*.
Moii (Williams). Cultivated variety of *Ipomoea batatas*.
Mokimoki (Colenso). *Doodia caudata*.
Mokimoki (Williams). *Mentha Cunninghamii*.
Mokimoki (Williams). *Polypodium pustulatum*.
Mokopiko (Bidwill). *Libocedrus Doniana*.
Monehu (Williams). Young shoots of *Pteridium aquilinum*.
Monenehu (Colenso, Williams). Cultivated variety of *Ipomoea batatas*.
Monoao (Williams). *Dracophyllum subulatum*.
More (Williams). A variety of the timber of *Agathis australis*.
Motuhanga (Percy Smith). Rhizome of *Pteridium aquilinum*.

Mouki (Percy Smith). *Asplenium bulbiferum.*
Mouku (Tregear). *Marattia salicina.*
Mouku (Percy Smith). *Asplenium bulbiferum.*
Mounga (H. C. Field). *Lygodium articulatum.*
Muka (Mantell, Williams). *Rhopalostylis sapida.*
Muka (Colenso, Williams). Prepared fibre of *Phormium.*
Mukimuki (Williams). *Doodia caudata.*
Munga (Williams). *Rhopalostylis sapida.*

Naereere (Elsdon Best). *Scleranthus biflorus.*
Nahinahi (Lindsay, Williams). *Calystegia sepium.*
Nahui (Cunningham). *Alternanthera sessilis.*
Namunamu (Elsdon Best). *Geranium molle.*
Nani (Williams). *Brassica campestris.*
Nao (D'Urville). *Linum monogynum.*
Napuka (Cunningham). *Veronica speciosa.*
Nau (Williams). *Lepidium oleraceum.*
Naupata (Colenso, Williams). *Coprosma Baueri.*
Naupiro (Tregear). *Coprosma foetidissima.*
Naupiro (Williams). *Angelica gingidium.*
Nehenehe (Williams). *Epacris alpina.*
Neinei (Colenso, Williams). *Dracophyllum latifolium.*
Neinei (Lyall). *Carmichaelia* spp.
Neineikura (Williams). *Hemitelia Smithii.*
Ngaio (Colenso, Williams). *Myoporum laetum.*
Ngakaukiore (Williams). *Clematis parviflora.*
Ngakaukore (Tregear). *Carmichaelia* sp.
Ngakaukuri (Williams). Cultivated variety of *Ipomoea batatas.*
Ngakomoa (Colenso). Cultivated variety of *Ipomoea batatas.*
Ngangarangi (Elsdon Best). *Dioscorea* (yam).
Ngapara (Percy Smith). Resinous heart-wood of *Dacrydium cupressinum.*
Ngarangara (Elsdon Best). *Mesembryanthemum australe.*
Ngaue (Williams). Cultivated variety of *Colocasia antiquorum.*
Ngawha (Elsdon Best). *Eleocharis sphacelata.*
Ngawha (Lindsay). *Typha angustifolia.*
Ngohungohu (Elsdon Best). *Cyathodes acerosa* and *Leucopogon fasciculatus.*
Ngongoro (Colenso). Cultivated variety of *Colocasia antiquorum.*
Ngungu (Williams). *Olearia Cunninghamii.*
Ngutukakariki (Williams). *Todea superba.*
Ngutungutu (Williams). *Todea superba.*
Ngutungutukiwi (Williams). *Todea superba.*
Nikau (Cunningham, Colenso, Williams, &c.). *Rhopalostylis sapida.*
Niko (Williams). *Brassica* sp.
Niko (Williams). *Phyllocladus trichomanoides.*
Nini (Williams). *Blechnum lanceolatum.*
Niniao (Elsdon Best). *Helichrysum glomeratum.*
Niniwa (Williams). *Gaultheria oppositifolia.*
Nohi (Williams). *Enargea parviflora.*
Nonokia (Elsdon Best). *Pomaderris apetala.*

Oho (Hector, Tregear). *Pseudopanax Lessonii.* Probably a mistake for Houhou.
Ohoeka (Lindsay, Williams). *Pseudopanax crassifolium.*
Oioi (Colenso). *Leptocarpus simplex.*
Ongaonga (Colenso, Williams). *Urtica ferox* and *U. incisa.*
Oramarama (Williams). *Drimys colorata.*
Orewa (Hector). *Sideroxylon costatum.*
Orihou (Williams). *Nothopanax Colensoi.*
Orooro (Williams). *Senecio Kirkii.*
Oru (Cunningham, Colenso). *Colensoa physaloides.*
Oue (Williams). A variety of *Phormium tenax.*

Paea (Williams). Cultivated variety of *Ipomoea batatas.*
Paea (Percy Smith). *Brassica oleracea.*
Paeangaanga (Colenso, Williams). Cultivated variety of *Colocasia antiquorum.*
Paetai (Percy Smith). *Avicennia officinalis.*
Paewhenua (Elsdon Best). *Rumex* (dock).

Pahau (Percy Smith). Cultivated variety of *Lagenaria vulgaris.*
Pahau-kakapo (Elsdon Best). *Dawsonia superba.*
Pahautea (Colenso). *Libocedrus Bidwillii.*
Paheke (Elsdon Best). *Hirneola polytricha.*
Pahengahenga (Williams). *Geniostoma ligustrifolium.*
Paihaukaka (Colenso). Cultivated variety of *Ipomoea batatas.*
Pakakohi (Williams). Rhizome of *Pteridium aquilinum.*
Pakaue (Williams). Cultivated variety of *Colocasia antiquorum.*
Pakauroharoha (Elsdon Best). *Dryopteris pennigera.*
Pakue (Hector). *Dicksonia squarrosa.*
Panahi (Colenso). Cultivated variety of *Ipomoea batatas.*
Panahi (Colenso, Williams). *Calystegia sepium.*
Panahi (R. H. Matthews). *Ipomoea palmata.*
Panake (Colenso). *Calystegia sepium.*
Panakenake (Elsdon Best). *Pratia angulata.*
Panako (Williams). *Asplenium obtusatum* and *A. lucidum.*
Panapana (Colenso). *Cardamine heterophylla.*
Pane (Colenso). Cultivated variety of *Ipomoea batatas.*
Paopao (Elsdon Best). *Scirpus lacustris.*
Papa (Williams). *Geniostoma ligustrifolium.*
Papahaoa (Williams). Cultivated variety of *Ipomoea batatas.*
Papahenga (Elsdon Best). *Geniostoma ligustrifolium.*
Papahueke (Elsdon Best). *Marchantia* sp.
Papaii (Colenso). *Aciphylla squarrosa* (young form).
Papaka (Williams). Cultivated variety of *Solanum tuberosum.*
Papakoura (Elsdon Best). *Epilobium microphyllum.*
Papao (Williams). *Scirpus lacustris.*
Papapa (Williams). *Pomaderris elliptica.*
Papapa (Williams). *Gualtheria antipoda.*
Papataniwhaniwha (Williams). *Lagenophora Forsteri.*
Papauma (Colenso). *Coprosma grandifolia.*
Papauma (Williams). *Griselinia littoralis.*
Para (Colenso, Williams). *Marattia fraxinea.*
Para (Williams). Cultivated variety of *Cordyline.*
Para (Williams). Tuber of *Gastrodia Cunninghamii* or *Orthoceras strictum* used as food.
Paraharaha (Elsdon Best). *Polypodium diversifolium.*
Parahia (Colenso). *Chenopodium pusillum.*
Parakaraka (Colenso, Williams). Cultivated variety of *Ipomoea batatas.*
Paranako (Williams). *Asplenium obtusatum* and *A. lucidum.*
Parani (Elsdon Best). *Lagenophora petiolata.*
Parapara (Colenso). *Pisonia Brunoniana.*
Parapara (Williams). *Pseudopanax Lessonii.*
Parapara (Elsdon Best). *Nothopanax arboreum.*
Paraparauma (Williams). *Griselinia littoralis.*
Parara (Williams). Rhizome of *Pteridium aquilinum.*
Parareka (Williams). *Solanum tuberosum.*
Parareka (H. C. Field). *Marattia fraxinea.*
Parataniwha (Lyall, Colenso). *Elatostemma rugosum.*
Paratawhiti (Williams). *Orthoceras strictum.*
Paratawhiti (H. C. Field, E. B. Dickson). *Marattia fraxinea.*
Parate (Williams). *Zea mays.*
Parekoritawa (Williams). *Phormium tenax* (variegated).
Parenako (Williams). *Asplenium obtusatum* and *A. lucidum.*
Pararerera (Lindsay, Williams). *Plantago* sp.
Paretao (Colenso). *Asplenium obtusatum* and *A. lucidum.*
Paretarakihi (Percy Smith). Cultivated variety of *Lagenaria vulgaris.*
Paretaua (Williams). Cultivated variety of *Ipomoea batatas.*
Parete (Williams). *Solanum tuberosum.*
Paritaniwha (Williams). Variety of *Phormium tenax.*
Paru-whatitiri (Elsdon Best). *Ileodictyon cibarium.*
Pata (Williams). *Leptospermum scoparium.*
Patai (Colenso). Cultivated variety of *Colocasia antiquorum.*
Patangatanga (Williams). Fruit of *Freycinetia Banksii.*
Patate (Lyall, Williams). *Schefflera digitata.*
Pate (Polack, Cunningham, Colenso, &c.). *Schefflera digitata.*
Patea (Colenso). Cultivated variety of *Ipomoea batatas.*

Patete (Williams). *Schefflera digitata.*
Patiti (Williams). *Microlaena stipoides.*
Patiti (Tregear). *Agropyrum scabrum.*
Patiti-taranui (Elsdon Best). *Agropyrum scabrum.*
Patotara (Colenso, Elsdon Best). *Leucopogon Fraseri.*
Patotara (Lyall). *Cyathodes acerosa.*
Patotara (Colenso). *Botrychium ternatum.*
Patutiketike (Elsdon Best). *Coprosma grandifolia* and *C. lucida.*
Pau (Williams). Cultivated variety of *Solanum tuberosum.*
Pauaatahu (Colenso). Cultivated variety of *Ipomoea batatas.*
Pehiakura (Williams). *Dicksonia squarrosa.* Erroneously spelled by Lindsay as Oehiakuri, and inserted in that form in the Handbook.
Pehu (Colenso). Cultivated variety of *Ipomoea batatas.*
Pehu (Williams). Cultivated variety of *Colocasia antiquorum.*
Peia (Williams). *Freycinetia Banksii.*
Peka-a-waka (Elsdon Best). *Earina mucronata.*
Pekapeka (Lyall). *Erechtities quadridentata.*
Pekepeke (Williams). *Celmisia gracilenta.*
Pekepeke-kiore (Elsdon Best). *Hydnum clathroides.*
Peoi (Williams). *Solanum aviculare.*
Pepepe (Williams). *Cladium Sinclairii.*
Pepepe (Elsdon Best). *Dianella intermedia.*
Pere (Colenso). *Alseuosmia Banksii.*
Perehia (Williams). *Deyeuxia Forsteri.*
Perei (Colenso). *Gastrodia Cunninghamii.*
Perei (Elsdon Best). *Orthoceras strictum.*
Peretako (Elsdon Best). *Blechnum Patersoni.*
Peretao (Elsdon Best). *Blechnum Patersoni.*
Peretao (Elsdon Best). *Asplenium falcatum.*
Petako (Elsdon Best). *Asplenium falcatum.*
Petipeti (Elsdon Best). *Blechnum discolor.*
Piamanuka (Colenso). Manna-like exudation of *Leptospermum scoparium.*
Piho (Williams). Cultivated variety of *Solanum tuberosum.*
Pikiarero (Colenso). *Clematis hexasepala* and *C. indivisa.*
Pikirangi (Tregear). *Loranthus* sp.
Pikirangi (Williams). *Elytranthe tetrapetala.*
Pikoko (Williams). A variety of *Phormium tenax.*
Pikopiko (Williams). *Polystichum Richardi.*
Pinakitere (Lindsay). *Geranium dissectum.*
Pinakitere (Williams). *Anisotome* sp.
Pinao (Williams). *Scirpus frondosus.*
Pinatoro (Williams). *Pimelea laevigata.*
Pingao (Colenso, Williams). *Scirpus frondosus.*
Piopio (Williams). *Dianella intermedia.*
Pipiko (Elsdon Best). *Polystichum Richardi.*
Pipiko-kauhangaroa (Williams). Cultivated variety of *Ipomoea batatas.*
Pipiro (Williams). *Coprosma foetidissima.*
Pirikahu (Colenso, Williams). *Acaena sanguisorbae.*
Pirinoa (Williams). *Tupeia antarctica.*
Pirinoa (Williams). *Loranthus* sp.
Piripiri (Colenso, Williams). *Acaena sanguisorbae.*
Piripiri (Cunningham, Williams). *Haloragis tetragyna* and *H. micrantha.*
Piripiri (Colenso). *Bulbophyllum pygmaeum.*
Piripiri (Williams, Elsdon Best). *Hymenophyllum polyanthos* and *H. demissum.*
Piripiriwhata (Cunningham, Williams). *Carpodetus serratus.*
Pirirangi (Elsdon Best). *Elytranthe tetrapetala.*
Pirita (Colenso, Williams). *Rhipogonum scandens.*
Pirita (Colenso). *Tupeia antarctica.*
Piriwhetau (Williams). *Acaena sanguisorbae.*
Pitau (Lindsay, H. C. Field). *Cyathea medullaris.*
Piupiu (Colenso). *Dryopteris pennigera.*
Piupiu (Williams). *Blechnum capense.*
Piupiu (H. C. Field). *Blechnum discolor.*
Poananga (Williams). *Clematis hexasepala.*
Poataniwha (Elsdon Best). *Melicope simplex.*
Pohata (Williams). *Brassica campestris.*

Pohue (Colenso). *Calystegia sepium.*
Pohuehue (Williams). *Muehlenbeckia complexa.*
Pohuehue (Hector). *Tetrapathaea tetrandra.*
Pohutukawa (Yate, Cunningham, Colenso). *Metrosideros tomentosa.*
Pohutukawa (Colenso). *Asplenium flaccidum.*
Pohutukawa (Colenso). Cultivated variety of *Ipomoea batatas.*
Poipapa (E. B. Dickson). *Chenopodium triandrum.*
Pokaka (Colenso, Williams). *Elaeocarpus Hookerianus.* In some districts also applied to *E. dentatus.*
Pokere, Pokerehu (Williams). Fruit of *Beilschmiedia Tawa.*
Pokerekahu (Colenso, Williams). Cultivated variety of *Ipomoea batatas.*
Pokopoko-nui-a-huru. *Clematis parviflora.*
Ponga (Colenso, Williams, &c.). *Cyathea dealbata.*
Pongi (Colenso, Williams). Cultivated variety of *Colocasia antiquorum.*
Poniu (Williams). *Nasturtium palustre.*
Popohui (Hector). *Arthropodium cirrhatum.*
Popoia-hakeke (Elsdon Best). *Polyporus* sp.
Popopo (E. B. Dickson). *Solanum aviculare.*
Poporo (Williams). *Solanum aviculare* and *S. nigrum.*
Poporokaiwhiri (Williams). *Hedycarya arborea.*
Poranga (Colenso). Cultivated variety of *Ipomoea batatas.*
Porerarua (Williams). *Erigeron canadensis.*
Porokaiwhiria (Colenso). *Hedycarya arborea.*
Poroporo (Cunningham, Colenso, Williams, &c.). *Solanum aviculare* and *S. nigrum.*
Poroporo-tanguru (Williams). *Solanum aviculare.*
Pororua (Colenso, Williams). *Sonchus oleraceus.*
Potaetae (Williams). *Clematis hexasepala.*
Potango (Colenso). Cultivated variety of *Colocasia antiquorum.*
Potango (Williams). A variety of *Phormium tenax.*
Pou (Kirk). *Sideroxylon costatum.*
Pouaka (Williams). *Festuca littoralis.*
Pouhawaiki (Williams). *Erigeron canadensis.*
Powhiri (Williams). *Pittosporum tenuifolium.*
Powhiwhi (R. H. Matthews). *Ipomoea palmata.*
Powhiwhi (R. H. Matthews). *Calystegia tuguriorum.*
Powhiwhi (E. B. Dickson). *Tetrapathaea tetrandra.*
Puahou (Elsdon Best). *Nothopanax arboreum.*
Puaka (Williams). *Dacrydium cupressinum.*
Puakaito (Elsdon Best). *Celmisia spectabilis.*
Puakarimu (E. B. Dickson). *Lycopodium densum.*
Pua-o-te-reinga (Rev. R. Taylor). *Dactylanthus Taylori.*
Puapua (Elsdon Best). *Clematis indivisa.*
Puarangitoto (Williams). *Senecio perdicioides.*
Puareinga (Rev. R. Taylor). *Dactylanthus Taylori.*
Puarere (Tregear). *Spinifex hirsutus.*
Puatahoe (Williams). Cultivated variety of *Ipomoea batatas.*
Puatataua (E. B. Dickson). *Clematis hexasepala.*
Puataua (Percy Smith). *Clematis hexasepala.*
Puatautaua (Williams). *Clematis hexasepala.*
Puatawhiwhi (Williams). *Metrosideros florida.*
Puatea (Williams). *Gnaphalium keriense.*
Puatea (E. B. Dickson). *Craspedia uniflora.*
Puawananga (Colenso, Lindsay, &c.). *Clematis indivisa.* Sometimes spelled Puawhananga.
Puharetaiko (T. Kirk). *Celmisia spectabilis.*
Puhaureroa (Williams). *Pisonia Brunoniana.*
Puhaureroa (Williams). *Senecio latifolius.*
Puheretaiko (Lyall, Traill). *Senecio rotundifolius.*
Puhikawa. *Drimys axillaris.*
Puhou (Lyall, Williams). *Coriaria ruscifolia.*
Puka (Colenso). *Meryta Sinclairii.*
Puka (Colenso, Williams). *Griselinia lucida.*
Puka (Elsdon Best). *Eugenia maire.*
Puka (Cunningham, Colenso, Williams). *Muehlenbeckia australis.*
Pukapuka (Colenso, Williams). *Brachyglottis repanda.*

Pukariao (Tregear). *Paratrophis heterophylla.*
Pukariao (Hector). *Brachyglottis repanda.*
Pukatea (Colenso, Williams, &c.). *Laurelia novae-zelandiae.*
Pukeatea (Williams). *Gnaphalium luteo-album.*
Puketangata (Elsdon Best). *Cyperus vegetus.*
Pukio (Elsdon Best). *Carex secta.*
Pukupuku (Williams). *Pelargonium australe.*
Pukupuku (Williams). *Doodia media.*
Pukurau (Williams). *Ileodictyon cibarium.*
Punawaru (Williams). *Siegesbeckia orientalis.*
Punaweta (Traill). *Carpodetus serratus.*
Pungapunga (Colenso, Williams). Pollen of *Typha angustifolia.*
Pungitangita (Elsdon Best). *Urtica* sp.
Puniu (Williams). *Stilbocarpa polaris.*
Puniu (Elsdon Best). *Todea superba.*
Puniu (Williams). *Polystichum aculeatum.*
Punui (Williams). *Stilbocarpa Lyallii.*
Punui (Colenso). *Cyathea Cunninghamii.*
Punui (Williams). *Dicksonia fibrosa.*
Punui (Williams). *Stilbocarpa polaris.*
Punuiarata (Williams). Cultivated variety of *Ipomoea batatas.*
Purata (Colenso). Cultivated variety of *Ipomoea batatas.*
Purei (Williams). *Carex secta.*
Purekireki (Williams). *Carex teretiuscula.*
Puriri (Yate, Polack, Cunningham, &c.). *Vitex lucens.*
Putaputaweta (Williams). *Carpodetus serratus.*
Puwatawata (Elsdon Best). *Enargea parviflora.*
Puwha (Colenso). *Sonchus oleraceus.*
Puwhakahara (Williams). Species of *Olea.*
Puwharawhara (Williams). *Astelia Banksii.*
Puwharetaiko (Williams). *Senecio rotundifolius.*
Puwharetaiko (Williams). *Celmisia spectabilis.*
Puwhaureroa (Williams). *Senecio latifolius.*
Puwhaureroa (Williams). *Pisonia Brunoniana.*

Rahurahu (Lindsay, Williams). *Pteridium aquilinum.*
Ramarama (Cunningham, Colenso, &c.). *Myrtus bullata.*
Ramarama (Williams). *Drimys colorata.*
Rangiora (Colenso, Williams). *Brachyglottis Rangiora.*
Raoriki (Williams). *Ranunculus macropus.*
Raoriki (Williams). *Ranunculus rivularis.*
Raparaparuru (Williams). A variety of *Solanum tuberosum.*
Rape (Williams). A variety of *Solanum tuberosum.*
Rarahu, Rarauhe (Williams). *Pteridium aquilinum.*
Rata (Yate, Polack, Cunningham, &c.). *Metrosideros robusta.*
Rata (Lyall). *Metrosideros lucida.*
Rata (Lyall). *Metrosideros florida.*
Ratapiki (Cunningham). *Metrosideros florida.*
Rataroa (Elsdon Best). Variety of *Phormium tenax.*
Rauaruhe (Williams). *Pteridium aquilinum.*
Rauhuia (Colenso). *Linum monogynum.*
Raukatauri (Elsdon Best). *Asplenium flaccidum.*
Raukawa (Colenso). *Nothopanax Edgerleyi.*
Raukumara (Williams). *Senecio perdicioides.*
Raumanga (E. B. Dickson). *Polypodium diversifolium.*
Raumangu (Elsdon Best). *Selliera radicans.*
Raumataki (Colenso). Cultivated variety of *Ipomoea batatas.*
Raumoa (Tregear). *Spinifex hirsutus.*
Rauparaha (Elsdon Best). *Calystegia sepium.*
Raupeka (Elsdon Best). *Earina suaveolens.*
Raupeti (Colenso, Williams). *Solanum nigrum.*
Raupo (Polack, Colenso, Williams). *Typha angustifolia.*
Raurakau (Williams). *Brachyglottis repanda.*
Raurakau (Williams). *Coprosma grandifolia.*
Rauraua (Edgerley). *Nothopanax Edgerleyi.*

Raurekau (Williams). *Coprosma grandifolia.*
Raurenga (Williams). *Trichomanes reniforme.*
Rauriki (Williams). *Sonchus oleraceus.*
Rauroroa (Williams). *Sonchus asper.*
Rautahi (Colenso). *Carex ternaria.*
Rautawhiri (Williams). *Pittosporum tenuifolium* and *P. Colensoi.*
Rautini (G. Mair). *Senecio Huntii.*
Rauwiri (Cunningham). *Leptospermum ericoides.*
Rauwiri (Williams). *Leptospermum scoparium.*
Rekoreko (Williams). *Selliera radicans.*
Remuremu (Williams). *Selliera radicans.*
Remuroa (Williams). *Solanum nigrum.*
Rena (Williams). *Dianella intermedia.*
Renga (Williams). Rhizome of *Pteridium aquilinum.*
Rengamutu (Elsdon Best). *Tetragonia expansa.*
Rengarenga (Yate, Colenso, Williams). *Arthropodium cirrhatum.*
Rengarenga (Williams). *Tetragonia expansa.*
Repehina (Williams). *Deyeuxia Forsteri.*
Repehina-papa (Elsdon Best). *Arthropodium candidum.*
Rerehape (Williams). A variety of *Phormium tenax.*
Rereti (Elsdon Best). *Blechnum lanceolatum.*
Rerewai (Williams). *Potamogeton natans* and *P. Cheesemanii.*
Retoreto (Williams). *Azolla rubra.*
Reua (Elsdon Best). *Dianella intermedia.*
Rewarewa (Yate, Polack, Cunningham). *Knightia excelsa.*
Rimu (Yate, Polack, Cunningham). *Dacrydium cupressinum.*
Rimu (Bidwill). *Dacrydium laxifolium.*
Rimu, Rimurimu (Elsdon Best). Generic term for mosses.
Rimurapa (Williams). *D'Urvillaea antarctica.*
Rimurehia (Williams). *Zostera nana.*
Ririwaka (Colenso, Williams). *Scirpus maritimus.*
Riwai (Williams). A general name for *Solanum tuberosum.*
Rohutu (Colenso, Williams). *Mrytus pedunculata* and *M. obcordata.*
Roi (Colenso, Williams). Rhizome of *Pteridium aquilinum.*
Rokeroke (Williams). Cultivated variety of *Solanum tuberosum.*
Rongotainui (Williams). A variety of *Phormium tenax.*
Roniu (Colenso). *Brachycome odorata.*
Ropi (Williams). Cultivated variety of *Solanum tuberosum.*
Rororo (Williams). *Olea montana.*
Ruerueke (Williams). *Mesembryanthemum australe.*
Rukutia (Williams). A variety of *Phormium tenax.*
Runa (Williams). *Rumex flexuosus.*
Runa (Cunningham). *Plagianthus divaricatus.*
Rutitira (F. A. D. Cox). *Cyathodes robusta.*

Taeaka (Williams). Cultivated variety of *Solanum tuberosum.*
Taewa (Williams). A general name for *Solanum tuberosum.*
Tahanui (Williams). Cultivated variety of *Cordyline.*
Tahune (Williams). Downy seeds of *Typha.*
Taiawa (Williams). A general name for *Solanum tuberosum.*
Taihinu (Elsdon Best). *Pomaderris phylaecifolia.*
Taiko (Williams). *Fusanus Cunninghamii.*
Taikura (Williams). Heart-wood of timber-trees.
Tainoka (Williams). *Carmichaelia australis.*
Tainui (Hector, Williams). *Pomaderris apetala.*
Taiore (Williams). Variety of *Phormium tenax.*
Taiore (Williams). *Rhipogonum scandens.*
Tairua (Elsdon Best). Turnip.
Taitea (Williams). Sap-wood of timber-trees.
Takahakaha (Williams). *Astelia Cunninghamii* (only used of the plant when in flower).
Takahikahi (Williams). *Gahnia* sp.
Takaka (Williams). *Pteridium aquilinum.*
Takaka (Percy Smith). *Melicope ternata.*
Takapo (Williams). *Gaultheria antipoda.*
Takapou (Elsdon Best). *Suttonia australis.*

Takatakapo (Colenso). Cultivated variety of *Colocasia antiquorum.*
Takawa (Williams). Fruit of *Piper excelsum* and of *Fuchsia excorticata.*
Takirikau (Williams). Applied to strong-fibred varieties of *Phormium tenax.*
Tamingi (Hector). *Epacris pauciflora.*
Tamure (Williams). A variety of *Phormium tenax.*
Tanae (Williams). Cultivated variety of *Colocasia antiquorum.*
Taneawai (Williams). A variety of *Phormium tenax* with bronzy foliage.
Tanehurangi (Williams). Cultivated variety of *Ipomoea batatas.*
Tanekaha (Yate, Cunningham, Colenso, &c.). *Phyllocladus trichomanoides.*
Tangeao (Colenso, Williams). *Litsaea calicaris.*
Tangeo (Williams). *Litsaea calicaris.*
Tanguru (Williams). *Olearia furfuracea.*
Taniwhaniwha (Williams). *Blechnum discolor.*
Tapairu (Williams, Elsdon Best). *Senecio Kirkii.*
Tapatapauma (Williams). *Griselinia littoralis.*
Tapatapauma (Williams). *Coprosma grandifolia.*
Tapau (Williams). *Suttonia australis.*
Tapia (Elsdon Best). *Tupeia antarctica.*
Tapitapi (Williams). *Alectryon excelsum.*
Tapoto (Williams). Applied to strong-fibred varieties of *Phormium tenax.*
Taputini (Colenso). Cultivated variety of *Ipomoea batatas.*
Tapuwaekotuku (Williams). *Gleichenia Cunninghamii.*
Taraheke (Williams). *Olearia* sp., same as heketara.
Taraheke (Williams). *Rubus australis.*
Taraire (Polack, Cunningham, Colenso, &c.). *Beilschmiedia Tarairi.*
Tara-a-maui (Williams). Trifoliolate variety of *Pseudopanax crassifolium.*
Tarakoi (Elsdon Best). *Paspalum scrobiculatum.*
Tara-kupenga (Elsdon Best). *Coprosma acerosa* and *Lycopodium* sp.
Taramaui (Williams). *Nothopanax* sp.
Taramea (Colenso, Williams). *Aciphylla Colensoi.*
Taramoa (Colenso). *Rubus australis.*
Taranga (Williams). *Melicytus lanceolatus.*
Tarangahape (Williams). *Carmichaelia* sp.
Taranga (Williams). *Pimelea longifolia.*
Tarangarara (Williams). *Gahnia lacera.*
Taranui (Williams). *Paspalum scrobiculatum.*
Tara-onga, Tara-ongaonga (Elsdon Best). *Urtica ferox* and *U. australis.*
Tarapapa (Williams). Flowers of *Freycinetia Banksii.*
Tarata (Colenso, Williams). *Pittosporum eugenioides.*
Taratamata (Williams). Cultivated variety of *Ipomoea batatas.*
Tarawera (Williams). *Pellaea rotundifolia.*
Tarawera (Percy Smith). *Pteris tremula.*
Tara-whata (Elsdon Best). *Hirneola polytricha.*
Tarikupenga (Tregear). *Lygodium articulatum.*
Taringa-kuri (Elsdon Best). *Hirneola polytricha.*
Taringa-o-Tiakiwai (Williams). The fungus *Hirneola polytricha.*
Taritari (Williams). *Dracophyllum latifolium.*
Taritari-awha (Elsdon Best). *Dracophyllum latifolium.*
Taro (Cunningham, Colenso, &c.). *Colocasia antiquorum.*
Taro-hoia (Colenso, Williams). A recently introduced variety of *Colocasia antiquorum.*
Taroa (Williams). Variety of *Phormium tenax.*
Tarutaru (Williams). A general name for grasses, especially the smaller species.
Tatairongo (Williams). Cultivated variety of *Solanum tuberosum.*
Tataka (Mantell). *Melicope ternata.*
Tatangi (Elsdon Best). *Gahnia lacera.*
Tatarahake, Tataraheke (Colenso). *Coprosma acerosa.*
Tataramoa (Cunningham, Colenso, &c.). *Rubus australis.*
Tataramoa-turuhunga (Elsdon Best). *Rubus australis.*
Tauhinu (Colenso, Williams). *Pomaderris phylicaefolia.*
Tauhinu (Hector). *Podocarpus nivalis.*
Tauhinu-korokio (Williams). *Cassinia leptophylla.*
Tauhinu-koromiko (Williams). *Cassinia leptophylla.*
Taumairangi (Elsdon Best). Turnip.
Taumingi (Williams). *Cyathodes acerosa.*

Taunoka (Williams). *Carmichaelia australis.*
Taupata (Percy Smith). *Coprosma Baueri.*
Taupuku (Elsdon Best). *Gaultheria antipoda.*
Taurapunga (Colenso, Williams). Cultivated variety of *Ipomoea batatas.*
Taurepo (Elsdon Best). *Rhabdothamnus Solandri.*
Tautamahei (Colenso). Cultivated variety of *Colocasia antiquorum.*
Tawa (Yate, Cunningham, Colenso, &c.). *Beilschmiedia Tawa.*
Tawai (Bidwill, Colenso, Williams). *Nothofagus fusca* and *N. Menziesii.*
Tawairauriki (Hector). *Nothofagus Solandri.*
Tawaiwai (Lindsay, Williams). *Phyllocladus trichomanoides.*
Tawao (Williams). *Carmichaelia* sp.
Tawao (Williams). *Taraxacum officinale.*
Tawapou (Colenso, Williams). *Sideroxylon costatum.*
Tawari (Colenso, Williams). *Ixerba brexioides.*
Tawatawa (Elsdon Best). *Adiantum* sp.
Taweke (Williams). *Sonchus asper.*
Taweku (Lindsay, Williams). *Coriaria ruscifolia.*
Tawhai (Colenso, Williams). *Nothofagus Menziesii* and *N. Solandri.*
Tawhairaunui (Colenso). *Nothofagus fusca.*
Tawhairauriki (Colenso). *Nothofagus Solandri.*
Tawhara (Colenso, Williams). Flowers of *Freycinetia Banksii.*
Tawhero (Lyall, Colenso, Williams). *Weinmannia sylvicola* and *W. racemosa.*
Tawhewheo (Williams, Elsdon Best). *Quintinia serrata.*
Tawhiri (Williams). *Pittosporum tenuifolium.*
Tawhirikaro (Lindsay). *Pittosporum cornifolium.*
Tawhiwhi (Williams). *Parsonsia heterophylla.*
Tawhiwhi (Colenso). *Pittosporum tenuifolium.*
Tawiniwini (Elsdon Best). *Gaultheria antipoda.*
Tete (Williams). *Todea superba.*
Teteaweka (Traill, Williams). *Olearia angustifolia.*
Tetereria (Williams). Cultivated variety of *Ipomoea batatas.*
Tetere-whete (Williams). *Polytrichum* sp.
Teure (Williams). Fruit of *Freycinetia Banksii.*
Ti (Colenso, &c.). A general name for all the species of *Cordyline.*
Ti-awe (Williams). *Cordyline australis* and *C. pumilio.*
Ti-eiei (Williams). *Cordyline* sp.
Ti-kapu (Colenso, Williams). *Cordyline indivisa.*
Ti-kapu (Elsdon Best). *Cordyline Banksii.*
Ti-kapu (Williams). *Cordyline pumilio.*
Ti-kauka (Williams). *Cordyline australis.*
Ti-koraha (Colenso). *Cordyline pumilio.*
Ti-kouka (Colenso, Williams). *Cordyline australis.*
Ti-kowhiti (Elsdon Best). *Cordyline* sp. (same as Ti-para).
Ti-kupenga (Lindsay). *Cordyline pumilio.*
Ti-kupenga (Williams). *Cordyline indivisa.*
Ti-mahonge (Williams). A subvariety of the Ti-para.
Ti-manu (Hammond). *Cordyline* sp.
Ti-matakutai (Williams). *Cordyline indivisa.*
Ti-ngahere (Williams). *Cordyline Banksii.*
Ti-papa (Williams). *Cordyline pumilio.*
Ti-para (Williams). *Cordyline* sp. Cultivated for the sugary root.
Ti-para (Elsdon Best). In South Island applied to *Cordyline australis.*
Ti-parae (Hector). *Cordyline Banksii.*
Ti-pore (Walsh). *Cordyline terminalis.*
Ti-pua (Williams). *Cordyline australis.*
Ti-rakau (Hector). *Cordyline australis.*
Ti-rauriki (Williams). *Cordyline pumilio.*
Tirawa (Elsdon Best). *Dicksonia squarrosa.*
Ti-tahanui (Williams). A variety of the Ti-para.
Ti-tawhiti (Hector). *Cordyline* sp. (same as Ti-para).
Ti-toi (Williams). *Cordyline indivisa.*
Ti-torere (Williams). *Cordyline Banksii.*
Ti-tuao (Williams). Variety of *Phormium.*
Ti-whanake (Williams). *Cordyline australis.*
Tihore (Hector, Williams, &c.). A name applied to a variety of *Phormium tenax* with remarkably strong fibre.

Tika (Williams). *Phormium tenax* (ordinary varieties).
Tikumu (Colenso). *Celmisia coriacea.*
Tikumu (Williams). *Celmisia spectabilis.*
Tio (Williams). *Dicksonia squarrosa.*
Tipau (Colenso, Williams). *Suttonia australis.*
Tirori (Percy Smith). Fruit of *Freycinetia Banksii.*
Titirangi (Lyall). *Veronica speciosa.*
Titoki (Colenso, Williams). *Alectryon excelsum.*
Titongi (Colenso, Williams). *Alectryon excelsum.*
Toatoa (Colenso). *Phyllocladus trichomanoides* and *P. glauca.*
Toatoa (D'Urville, Williams). *Haloragis erecta.*
Toetoe (Colenso, &c.). *Arundo conspicua.*
Toetoe (Colenso, &c.). *Mariscus ustulatus.*
Toetoe (Williams). A general name for large-leaved grasses and sedges.
Toetoe-hunangamoho (Williams). *Danthonia Cunninghamii.*
Toetoe-kakaho (Williams). *Arundo conspicua.*
Toetoe-kiwi (Williams). *Gahnia lacera.*
Toetoe-mata (Elsdon Best). *Carex teretiuscula* and *Gahnia lacera.*
Toetoe-mokoro (Elsdon Best). *Arundo conspicua.*
Toetoe-ngaungau (Elsdon Best). *Gahnia lacera.*
Toetoe-rakau (Elsdon Best). *Arundo conspicua.*
Toetoe-rautahi (Williams). *Carex ternaria.*
Toetoe-tarangarara (Williams). *Gahnia lacera.*
Toetoe-tuhara (Williams). *Cladium Sinclairii.*
Toetoe-upokotangata (Williams). *Mariscus ustulatus.*
Toetoe-whatumanu (Lyall, Williams). *Mariscus ustulatus.*
Toheraoa (Williams). *Deyeuxia Fosteri.*
Tohetaka (Elsdon Best). *Taraxacum officinale.*
Toi (Colenso). *Barbarea vulgaris.*
Toii (Colenso, &c.). *Cordyline indivisa.*
Toikahikatea (Colenso). Cultivated variety of *Ipomoea batatas.*
Toitoi (Colenso). Cultivated variety of *Ipomoea batatas.*
Tokitoki (Williams). *Alectryon excelsum.*
Tokotokohau (Colenso). Cultivated variety of *Colocasia antiquorum.*
Tongitongi (Williams). *Alectryon excelsum.*
Tope (Elsdon Best). New growth of *Pteridium aquilinum.*
Topitopi (Mantell). *Alectryon excelsum.*
Toro (Colenso, Williams). *Persoonia Toru.*
Toro (Williams). *Mrysine salicina.*
Toroamahoe (Colenso, Williams). Cultivated variety of *Ipomoea batatas.*
Toroheke (Williams). *Pimelea arenaria.*
Toromiro (Colenso, Williams). *Podocarpus ferrugineus.*
Toropapa (J. Adams). *Alseuosmia macrophylla.*
Toropapa (Elsdon Best). *Alseuosmia quercifolia.*
Toroputa (Percy Smith). *Gaultheria* sp.
Tororaro (Elsdon Best). *Muehlenbeckia complexa.*
Torotoro (Lindsay, Williams). *Metrosideros scandens.*
Torowhenua (Colenso). Cultivated variety of *Ipomoea batatas.*
Toru (Colenso). *Persoonia Toru.*
Totara (Yate, Polack, Cunningham). *Podocarpus totara.*
Totara (Lindsay). *Cyathodes acerosa.*
Totara (Colenso, Williams). *Leucopogon Fraseri.*
Totara-kiri-kotukutuku (Mantell). *Libocedrus Doniana.*
Totara-papa, Totara-parae, Totara-tahuna (Elsdon Best). *Leucopogon Fraseri.*
Totoroene (Elsdon Best). *Parsonsia capsularis.*
Totorowhiti (Williams). *Dracophyllum strictum.*
Towai (Cunningham, Williams, &c.). *Weinmannia sylvicola* and *W. racemosa.*
Towai (Raoul). *Paratrophis heterophylla.*
Tuakura (Lindsay, Williams). *Dicksonia squarrosa.*
Tuanui (Williams). A variety of *Podocarpus totara.*
Tuhara (Williams). *Cladium Sinclairii.*
Tuhuhi (Elsdon Best). *Eugenia maire.*
Tuhui (Elsdon Best). *Paspalum scrobiculatum.*
Tukauki (Williams). *Libertia ixioides.*

Tukirunga (Colenso). *Dicksonia fibrosa.*
Tukorehu (Lindsay, Williams). *Plantago* sp.
Tukou (Colenso). Cultivated variety of *Ipomoea batatas.*
Tumatakuri (Colenso). *Discaria Toumatou.*
Tumatakuru (Elsdon Best). *Aciphylla squarrosa* (mature form, see Papaii).
Tumatakuru (Colenso, Williams). *Discaria Toumatou.*
Tumingi (Elsdon Best). *Gaultheria* sp.
Tumingi (Williams). *Leucopogon fasciculatus.*
Tumingi (Lyall). *Cyathodes acerosa.*
Tuokura (Elsdon Best). *Dicksonia lanata.*
Tupakihi (Polack, Cunningham, Colenso). *Coriaria ruscifolia.*
Tupare (Traill, Williams). *Olearia Colensoi.*
Tupari (Hector). *Olearia operina* and *O. Lyallii.*
Tupari (Percy Smith). *Blechnum capense.*
Tuputupu (Polack). *Avicennia officinalis.*
Turawera (Colenso). *Pteris tremula.*
Turepo (Williams). *Paratrophis heterophylla.*
Turikakoa (Williams). *Spinifex hirsutus.*
Turikoka (Williams). *Deyeuxia Forsteri.*
Turitaka (Colenso). Cultivated variety of *Colocasia antiquorum.*
Turutu (Lindsay, Williams). *Dianella intermedia.*
Turutu (Lyall). *Libertia ixioides.*
Tutaeikamoana (Williams). *Tetragonia expansa.*
Tutaekaahu (E. B. Dickson). *Oxalis magellanica.*
Tutaekiore (E. B. Dickson). *Euphrasia cuneata.*
Tutaekoau (Williams). *Apium australe.*
Tutaetara (Colenso). Cultivated variety of *Ipomoea batatas.*
Tutahuna (Elsdon Best). *Raoulia tenuicaulis.*
Tutanga (Williams). Cultivated variety of *Ipomoea batatas.*
Tutoke (Elsdon Best). *Polystichum Richardi.*
Tutu (Lyall, Lindsay, Williams). *Coriaria ruscifolia.*
Tutuhanga (Colenso). Cultivated variety of *Ipomoea batatas.*
Tutuheuheu (Mantell). *Coriaria thymifolia.*
Tutukiwi (Elsdon Best). *Pterostylis Banksii.*
Tutumako (Williams). *Euphrasia cuneata.*
Tutunawai (Colenso, Williams). *Polygonum serrulatum.*
Tutupapa (Colenso, Williams). *Coriaria thymifolia.*

Uhi (Elsdon Best). *Dioscorea* sp. (yam).
Uhiperei (Williams). *Gastrodia Cunninghamii.*
Upokotangata (Colenso). *Mariscus ustulatus.*
Upokotiketike (Colenso). Cultivated variety of *Colocasia antiquorum.*
Ureure (Colenso, Williams). Fruit of *Freycinetia Banksii.*
Ururangi (Williams). Cultivated variety of *Ipomoea batatas.*
Uruuruwhenua (Williams). *Dicksonia squarrosa.*
Uwhi (Elsdon Best). *Dioscorea* sp. (yam).
Uwhi (Williams). Variety of *Solanum tuberosum.*
Uwhikaho (Williams). *Dioscorea* sp.
Uwhipara (Tregear). *Marattia fraxinea.*

Waekahu (Lindsay). *Lycopodium volubile.*
Waekahu (Williams). *Muehlenbeckia complexa.*
Waekura (Elsdon Best). *Gleichenia Cunninghamii.*
Waeruru (Williams). Cultivated variety of *Solanum tuberosum.*
Waewaekaka (Colenso, Williams). *Gleichenia circinata.*
Waewaekoukou (Colenso, Williams). *Lycopodium volubile.*
Waewaekoukou (R. H. Matthews). *Lycopodium densum.*
Waewae-kotuku (Williams). *Gleichenia circinata.*
Waewaematuku (Colenso). *Gleichenia circinata.*
Wahu (Williams). *Drosera* sp.
Waiha (Williams). Cultivated variety of *Ipomoea batatas.*
Waikure (Williams). *Avicennia officinalis.*
Waina (Williams). Introduced variety of *Ipomoea batatas.*
Wairua (Williams). *Funaria hygrometrica.*
Wairuaarangi (Colenso). Cultivated variety of *Colocasia antiquorum.*
Wairuru (Williams). Edible fungus frequently found on the trunk of the Tawa.

Waiti (Williams). Sweet sap of the ti (*Cordyline*).
Waiuatua (Colenso). *Euphorbia glauca.*
Waiuatua (Williams). *Rhabdothamnus Solandri.*
Waiuatua (Williams). *Gaultheria oppositifolia.*
Waiuokahukura (Williams). *Euphorbia glauca.*
Waniwani (Colenso, Williams). Cultivated variety of *Ipomoea batatas.*
Waoriki (Elsdon Best). *Ranunculus rivularis.*
Wawa (Williams). *Scirpus lacustris.*
Wawatai (Elsdon Best). *Spinifex hirsutus.*
Wawaupaku (Colenso). *Nothopanax anomalum.* More correctly Whauwhaupaku.
Wekeweke (Williams). *Sonchus asper.*
Weki (Colenso). *Dicksonia squarrosa.* Same as Wheki, which is a more common spelling.
Wenewene (Williams). Cultivated variety of *Lagenaria vulgaris.*
Weni (Williams). Cultivated variety of *Ipomoea batatas.*
Whakakumu (Colenso). Cultivated variety of *Ipomoea batatas.*
Whakapiopio (Lindsay, Williams). *Metrosideros scandens.*
Whakatangitangi (Lindsay, Williams). *Metrosideros florida.*
Whakatata (Tregear). *Corokia buddleoides.*
Whakatata (F. A. D. Cox). *Corokia macrocarpa.*
Whakou (Elsdon Best). Flowers of *Ixerba brexioides.*
Whanake (Williams). *Cordyline australis.*
Whangai-rangatira (Percy Smith). Cultivated variety of *Lagenaria vulgaris.*
Whangewhange (Elsdon Best). *Geniostoma ligustrifolium.*
Whara (Williams). *Astelia* sp.
Wharangi (Colenso, Williams). *Melicope ternata.*
Wharangi (Elsdon Best). *Brachyglottis repanda.*
Wharangi-kura (Elsdon Best). *Olearia macrodonta.*
Wharangipiro (Lyall). *Olearia Cunninghamii.*
Wharangipiro (Williams). *Olearia furfuracea.*
Wharangipiro (Colenso). *Melicope ternata.*
Wharangitawhito (Tregear). *Brachyglottis repanda.*
Wharanui (Williams). Variety of *Phormium tenax.*
Whararíki (Williams). *Phormium Colensoi.*
Wharawhara (Williams). *Astelia Banksii.*
Whareatua (Elsdon Best). *Lycopodium* sp.
Whareatua (Williams). *Agaricus campestris.*
Wharekohu (Williams). *Dracophyllum Urvilleanum.*
Wharengarara (Williams). *Pimelea laevigata.*
Wharewhareatua (Williams). *Pittosporum cornifolium.*
Whatitiri (Elsdon Best). *Pomaderris phylicaefolia.*
Whau (Cunningham, Colenso, &c.). *Entelea arborescens.*
Whauama (Elsdon Best). *Entelea arborescens.*
Whauma (Williams). *Entelea arborescens.*
Whaupaku (Williams). *Nothopanax arboreum.*
Whauwhau (Lindsay). *Gaya Lyallii.*
Whauwhau (Cunningham). *Pseudopanax Lessonii.*
Whauwhau (Williams). *Nothopanax arboreum.*
Whauwhaupaku (Colenso). *Nothopanax arboreum.*
Whauwhi (Colenso, Williams). *Hoheria populnea.*
Whauwhi (Hector). *Plagianthus betulinus.*
Whauwhi (Lyall). *Gaya Lyallii.*
Whawhakou (Hector). *Eugenia maire.*
Whe (Williams). *Hemitelia Smithii.*
Wheki (Williams). *Dicksonia squarrosa.*
Whekikohunga (Williams). *Dicksonia fibrosa.*
Whekiponga (Colenso, Williams). *Dicksonia fibrosa.*
Wheterau (Williams). *Ileodictyon cibarium.*
Wheuwheu (Williams). *Hypnum clandestinum.*
Whinau (Williams). *Elaeocarpus dentatus.*
Whinaupuka (Elsdon Best). *Elaeocarpus Hookerianus.*
Whiri-o-Raukatauri (Elsdon Best). *Asplenium flaccidum.*
Whiri-o-Raukatauri (Elsdon Best). *Lycopodium Billardieri.*
Whitau (Mantell, Williams). Dressed fibre of *Phormium.*
Wi (Colenso, &c.). *Juncus effusus* and other species.
Wi (Williams). *Poa caespitosa.*
Wiwi (Colenso, Williams). *Juncus effusus* and *J. maritimus.*
Wiwi (Lyall). *Scirpus nodosus.*

IV. GLOSSARY.

ABERRANT. Deviating from the established rule or type.
ABNORMAL. Contrary to rule ; deviating from the usual structure.
ABORTION. Suppression or imperfect development of any part.
ABORTIVE. Imperfectly developed, as in the case of stamens which do not bear anthers.
ABRUPT. Terminating suddenly as if the end were cut or broken off.
ABRUPTLY ACUMINATE. Ending in a point arising from a broad extremity.
ABRUPTLY PINNATE. Applied to a pinnate leaf when it ends with a pair of leaflets.
ACAULESCENT. Stemless, or without a conspicuous stem.
ACCRESCENT. Enlarging in size with age, as the calyx of some plants after the flowering period.
ACCUMBENT. Lying against another body ; applied to cotyledons when their edges are placed against or pointing towards the radicle.
ACEROSE. Needle-shaped, as the leaves of true pines.
ACHENE. A small hard and dry indehiscent 1-celled and 1-seeded fruit.
ACHLAMYDEOUS. Having neither calyx nor corolla ; destitute of perianth.
ACICULAR. Needle- or bristle-shaped ; rather more slender than acerose.
ACINACIFORM. Scimitar-shaped.
ACOTYLEDON. A plant destitute of cotyledons or seed-lobes ; Cryptogams.
ACULEATE. Furnished with prickles or sharp points, as the stem of a rose.
ACUMINATE. Tapering to a gradually diminishing point.
ACUTE. Sharply pointed but not drawn out ; also applied to any organ having a sharp edge or margin.
ADHERENT. Union of dissimilar parts, as when the calyx-tube is joined to the ovary.
ADNATE. Attached by the whole length ; as when anthers have their lobes attached along their whole length to the filament, or when stipules adhere by their whole length to the petiole.
ADPRESSED. See APPRESSED.
ADVENTITIOUS. Of accidental or abnormal occurrence, as when roots are produced from the stem or branches.
AESTIVATION. The manner in which the parts of a flower are arranged or folded while in bud.
AFOLIATE. Having no leaves.
AGGREGATED. Crowded together, but not actually coherent.
ALATE. Winged, or having expansions like wings ; as sometimes on a stem or petiole, or on the fruit or seeds.
ALBUMEN. The nutritive matter stored within the seed and usually surrounding the embryo.
ALBUMINOUS. Applied to seeds containing albumen.
ALLIACEOUS. Possessing the smell of garlic or onions.
ALPINE. Applied to plants peculiar to high altitudes above the limits of forest-growth.
ALTERNATE. (1.) Applied to leaves when they are placed singly on the stem ; not opposite. (2.) Also used with respect to the different parts of the flower, as when stamens are alternate with petals—that is, intermediate to them, not opposite.
ALVEOLATE. Marked like honeycomb ; deeply and closely pitted.
AMORPHOUS. Without regular or definite form ; shapeless.
AMPHIBIOUS. Growing equally well in water or on dry land.
AMPHITROPAL, AMPHITROPOUS. Applied to the ovule when it is curved so that both ends are brought near together.
AMPLEXICAUL. Applied to leaves or stipules when the base is dilated and embraces the stem.
ANASTOMOSING. When one vein unites with another, the union forming a reticulation or network.
ANATROPAL, ANATROPOUS. When the ovule is reversed or bent back so that the micropyle is close to the hilum and the chalaza at the other end.
ANDROECIUM. The male system of a flower ; the stamens collectively.
ANDROGYNOUS. Having both male and female flowers in the same inflorescence, as in many species of *Carex*.
ANEMOPHILOUS. Flowers which are fertilized through the agency of the wind, the pollen being conveyed through the air.

ANGIOSPERMS, ANGIOSPERMAE. Plants having their ovules enclosed in an ovary.
ANNUAL. Applied to plants which grow up and perish in one season.
ANNULAR. Ring-shaped.
ANNULATE. Furnished with rings or belts.
ANNULUS. In ferns, applied to an elastic ring which partially or wholly surrounds the sporangium and ruptures it at maturity.
ANTERIOR. Placed in front, or turned away from the axis.
ANTHER. That portion of a stamen which contains the pollen.
ANTHERIDIUM. The male sexual organ in Cryptogams, answering to the anther in Phanerogams.
ANTHEROZOIDS. Motile cells provided with cilia, produced within an antheridium; also called "spermatozoids."
ANTHESIS. The period of expansion of a flower.
ANTICOUS. Remote, or turned away from the axis.
APETALOUS. Having no corolla or inner perianth.
APEX. The tip or summit of any organ.
APHYLLOUS. Not possessing leaves.
APICAL. At the apex or summit.
APICULATE. Abruptly ending in a short and sharp point.
APOCARPOUS. Applied to a flower in which the carpels or ovaries are separate.
APPENDAGE. Something added or attached to an organ, but not an essential part of it.
APPENDICULATE. Furnished with appendages.
APPRESSED. Lying flat or pressed close for the whole length, as hairs to the surface of a leaf.
AQUATIC. Living in water.
ARACHNOID. Resembling a spider's web.
ARBORESCENT. Resembling a tree in size and mode of growth.
ARCHEGONIUM. The female sexual organ in Cryptogams, containing the oosphere, which after fertilization develops into the sporophyte.
ARCUATE. Curved or bent like a bow.
AREOLE. A small area or space marked out on any surface; a small interstice or cavity; a space in any reticulated surface.
AREOLATE. Marked with areoles; divided into distinct spaces or meshes.
AREOLATION. A system of reticulated markings.
ARIL, ARILLUS. An expansion of the funicle, more or less enveloping the seed.
ARILLATE. Provided with an aril.
ARISTATE. Awned; provided with a bristle-like point.
ARTICULATED. Jointed; separated into distinct members or joints.
ASCENDING. Rising somewhat obliquely; not quite erect.
ASPEROUS. Rough; harsh to the touch.
ATTENUATE. Tapering gradually; drawn out.
AURICLE. A small ear-like lobe or appendage at the base of a leaf.
AURICULATE. Provided with auricles.
AWL-SHAPED. Shaped like the point of an awl; narrow and tapering to a point.
AWN. A bristle-like terminal or dorsal appendage; especially common on the glumes of grasses.
AWNED. Having awns.
AXIL, AXILLA. The angle contained between the axis and any organ arising from it, as a leaf.
AXILE. Belonging to the axis or situated in it, as axile placentation.
AXILLARY. Growing in an axil.
AXIS. The central line of a body in the direction of its length; the stem.

BACCATE. Berried; having the form or nature of a berry.
BARB. Hooked hairs.
BARBATE. Bearded; provided with long weak hairs arranged in tufts.
BARBED. Furnished with barbs or hooked hairs.
BARBELLATE. Provided with short stiff hairs.
BARK. The outer covering or integument of the wood exterior to the cambium layer.
BASAL. At the base of any organ or part.
BASIFIXED. Attached by the base or lower end.
BASILAR. Basal.
BEAK. A prolonged tip.
BEAKED. Ending in a beak; often applied to fruits which end in a long point.
BERRY. A succulent or pulpy fruit containing many seeds.

BI- or BIS-. A Latin prefix signifying two or twice—as bibracteate, having two bracts; bidentate, with two teeth.
BIENNIAL. A plant which lives only two years.
BIFARIOUS. Arranged in two opposite rows or ranks; distichous.
BIFID. Two-cleft; divided half-way into two.
BILABIATE. Divided into lips, as is the case with many gamopetalous corollas.
BILOCULAR. Two-celled.
BINATE. Applied to leaves composed of two leaflets at the end of a common petiole, or to a single leaf almost divided into two.
BIPARTITE. Divided nearly to the base into two parts.
BIPINNATE. Twice pinnate; when both the primary and secondary divisions of a leaf are pinnate.
BISERRATE. Doubly serrate, as when the serratures themselves are serrate.
BITERNATE. Twice ternate.
BLADE. The expanded portion of a leaf.
BRACT. A modified leaf subtending a flower or a cluster of flowers; modified leaves placed in the space between the calyx and the true leaves.
BRACTEATE. Furnished with bracts.
BRACTEOLE. A secondary bract upon the pedicel of a flower; a small bract.
BRACTEOLATE. Furnished with bracteoles.
BRANCH. A division of the stem or main axis.
BRANCHLET. A small branch; the ultimate division of a branch.
BRISTLE. A stiff hair.
BRISTLE-POINTED. Ending in a stiff, bristle-like hair.
BUD. The early stage of a flower or branch.
BULB. A rounded subterranean body formed of fleshy scales or coatings; in reality a modified bud which ultimately develops leaves and flowers.
BULBOUS. Having bulbs, or possessing the structure of a bulb.
BULLATE. Blistered or puckered, as the leaf of *Myrtus bullata*.

CADUCOUS. Falling away early; not at all persistent.
CAESPITOSE. Growing in tufts somewhat in the same way as grass.
CALCARATE. Provided with a spur.
CALLOSITY. A thickened and hardened swelling on the surface of any organ.
CALLUS. (1.) Any abnormally thickened part. (2.) In grasses, applied to a swelling or extension of the flowering glumes at their insertion on the axis or rhachilla of the spikelet.
CALYCINE. Pertaining to or resembling a calyx.
CALYCULATE. Having a whorl of bracts outside the true calyx and resembling it.
CALYPTRATE. Hood-like, or bearing a hood or cap.
CALYX. The outer series of floral envelopes.
CAMPANULATE. Bell-shaped.
CAMPYLOTROPAL, CAMPYLOTROPOUS. Applied to an ovule when one end has grown faster than the other, so as to cause the apex (or micropyle) to curve inwards and approach the hilum.
CANALICULATE. Having a longitudinal groove or channel.
CAPILLARY. Very slender and hair-like.
CAPITATE. (1.) Having a rounded head. (2.) Growing in heads, as the flowers of *Compositae*.
CAPITELLATE. The diminutive of "capitate."
CAPSULE. A dry many-seeded seed-vessel, splitting into valves.
CAPSULAR. Having fruit of the nature of a capsule.
CARINA. The name applied to the keel, or the two cohering anterior petals of a papilionaceous flower.
CARINATE. Keeled.
CARPEL. A simple pistil, or that element of a compound pistil which answers to a single leaf.
CARPOPHORE. A portion of the axis or receptacle elongated between the carpels and protruding beyond them, as in *Geranium* and many *Umbelliferae*.
CARTILAGINOUS. Firm and tough; resembling cartilage.
CARUNCLE. A wart or prominence near the base or hilum of a seed.
CARUNCULATE. Having a caruncle.
CARYOPSIS. A small one-celled and one-seeded fruit with a thin, closely adherent pericarp; the fruit of grasses.
CATKIN. A deciduous spike consisting of unisexual apetalous flowers.
CAUDATE. Tailed; drawn out into a tail-like appendage.

CAUDEX. The axis of a plant, consisting of the stem and root; the stem of a palm or tree-fern.
CAUDICLE. In orchids, applied to the slender often strap-shaped body connecting the pollen-masses with the rostellum.
CAULINE. On or belonging to the stem; frequently applied to leaves growing on the stem, as opposed to those springing from near the root.
CELL. (1.) An independent portion of protoplasm, bounded by a wall of cellulose, and containing a nucleus; the unit of all cellular structure. (2.) A cavity or separate enclosure, as of an ovary or anther.
CELLULAR. Composed of minute cells.
CENTRIFUGAL. Applied to an inflorescence which develops from the centre outwards, as the cyme.
CENTRIPETAL. Applied to an inflorescence which develops from the margin towards the centre, or from the base towards the summit, as the corymb, raceme, &c.
CERNUOUS. Nodding, but hardly pendulous.
CHANNELLED. Having a longitudinal groove like a gutter.
CHARTACEOUS. Papery; having the texture of paper.
CHLOROPHYLL. The green colouring-matter within the cells of plants.
CILIATE. Having the margin (and sometimes the nerves) fringed with hairs.
CILIOLATE. Fringed with minute hairs.
CINEREOUS. Ashy-grey.
CIRCINATE. Coiled from the tip into a spiral, as the young fronds of ferns.
CIRCUMSCISSILE. Opening by a transverse circular line.
CIRRHATE, CIRRHOSE. Bearing tendrils.
CLADODE. A flattened branch simulating a leaf.
CLAVATE. Club-shaped; growing gradually thicker towards the top.
CLAW. The elongated narrow base of a petal.
CLEISTOGAMIC. Producing flowers which never expand, and which are self-fertilized.
COHERENT. The union of one part of an organ with other parts of the same organ, as when petals cohere to form a tubular corolla, &c.
COLLATERAL. Placed side by side.
COLUMN. A body formed by the union of the stamens and styles, as in orchids.
COMMISSURE. The face by which two carpels cohere, as in the *Umbelliferae*.
COMPLICATE. Folded upon itself.
COMPRESSED. Flattened laterally.
CONCAVE. Hollow, as the inner surface of a saucer.
CONDUPLICATE. Folded together lengthwise.
CONFLUENT. Blended or running together.
CONGESTED. Crowded together.
CONGLOBATE. Collected into a ball or globe.
CONICAL. Cone-shaped; narrowed to a point from a circular base.
CONNATE. When related parts are united, either congenitally or by subsequent growth.
CONNECTIVE. That portion of a stamen which connects the two lobes of an anther.
CONNIVENT. Coming into contact; converging together.
CONSTRICTED. Drawn together; contracted.
CONTORTED. Twisted.
CONTRACTED. Reduced in width or length.
CONVEX. Having a more or less rounded surface; opposed to "concave."
CONVOLUTE. Rolled together or on itself, or when one part is rolled up in another.
CORDATE. Heart-shaped; applied to leaves which have the petiole at the broader and notched end.
CORIACEOUS. Tough, leathery.
COROLLA. The inner perianth, consisting of the petals, free or united.
COROLLINE. (1.) Seated on or belonging to the corolla. (2.) Corolla-like or petaloid.
CORYMB. A flat-topped or convex open inflorescence with a short axis, flowering from the margin inwards.
CORYMBOSE. Arranged in corymbs or resembling a corymb.
COSTA. A rib; when one only, a midrib or mid-nerve.
COSTATE. Ribbed; having one or more longitudinal ribs or nerves.
COTYLEDON. The first leaves of the embryo—one in monocotyledons, two or rarely more in dicotyledons.
CRENATE. Applied to a leaf having its margin cut into rounded notches.
CRENULATE. Finely crenate.
CRESTED. Having an elevated ridge or appendage like the crest of a helmet.
CRISPED. Curled; crumpled.
CRUSTACEOUS. Hard and brittle in texture.

CRYPTOGAM, CRYPTOGAMOUS. Plants destitute of stamens, pistils, and true seeds containing an embryo.
CUCULLATE. Hooded or hood-shaped.
CULM. The hollow jointed stem of grasses.
CUNEATE. Wedge-shaped; triangular with the apex downwards.
CUSP. A sharp rigid point.
CUSPIDATE. Terminating in a cusp.
CUTICLE. The outermost skin or epidermis.
CYATHIFORM. Shaped like a drinking-glass a little widened at the top.
CYME. A broad and rather flat open inflorescence, flowering from the centre outwards.

DECANDROUS. Having ten stamens.
DECIDUOUS. Falling off after a time; not persistent.
DECLINATE. Bent or curved downwards.
DECOMPOUND. Repeatedly compound or divided.
DECUMBENT. Reclining or horizontal at the base, but ascending at the summit.
DECURRENT. Running downwards; applied to a leaf prolonged below its point of insertion.
DECUSSATE. In pairs crossing alternately at right angles, as the leaves in many species of *Veronica*.
DEFINITE. (1.) Of a constant number, not exceeding twenty. (2.) Limited or determinate, as definite inflorescence, where the axis ends in a flower.
DEFLEXED. Bent abruptly downwards.
DEHISCENCE. The manner in which a fruit-capsule or anther-cell opens at maturity.
DEHISCENT. Opening or splitting into definite parts.
DELTOID. Shaped like the Greek letter Δ; broadly triangular.
DENDROID. Resembling a tree in shape or mode of branching.
DENTATE. Toothed; possessing regular teeth pointing straight outwards.
DENTICULATE. Finely toothed.
DEPAUPERATE. Reduced in size, as if starved or impoverished.
DEPENDENT. Hanging down.
DEPRESSED. Flattened from above.
DEXTRORSE. Towards the right hand.
DIADELPHOUS. Having the stamens united in two bundles.
DIANDROUS. Possessing two stamens.
DIAPHANOUS. Allowing light to pass through; pellucid.
DICHLAMYDEOUS. Applied to those plants whose flowers have a double perianth, or both calyx and corolla.
DICHOTOMOUS. Repeatedly forked by pairs.
DICOTYLEDONS. Those plants whose embryo possesses two cotyledons or seed-lobes.
DIDYMOUS. In pairs or deeply divided into two lobes.
DIDYNAMOUS. Having four stamens placed in pairs, two long and two short.
DIFFUSE. Loosely or widely spreading.
DIGITATE. Fingered; applied to a compound leaf in which the leaflets spread from the top of the petiole.
DILATED. Widened; expanded.
DIMIDIATE. Halved, as when half of a leaf is so much smaller than the other as to appear wanting.
DIMORPHIC, DIMORPHOUS. Occurring in two forms.
DIOECIOUS. Unisexual; having the male and female flowers on different plants.
DIPETALOUS. Having two petals.
DIPHYLLOUS. Possessing two leaves.
DISC. (1.) A dilation or development of the receptacle within the calyx or within the corolla and stamens. (2.) The central portion of the flower-head of a Composite, as opposed to the ray. (3.) The face of any organ, in contradistinction to the margin.
DISCIFORM. Having the shape of a disc—circular and depressed.
DISCOIDAL. Same as "disciform."
DISSECTED. Deeply divided or cut into many segments.
DISSEPIMENT. The partitions separating the cells of an ovary or fruit.
DISTICHOUS. Arranged in two vertical rows or ranks, as the florets of many grasses.
DISTINCT. Separate; not united.
DIVARICATE. Widely spreading.
DIVERGENT. Spreading farther apart; the opposite of "convergent."
DIVIDED. Cleft almost to the base.
DORSAL. On or relating to the back of any organ.

Dorsifixed. Attached by or on the back.
Dotted. Marked with transparent receptacles of oil, looking like dots.
Drupaceous. Resembling or of the nature of a drupe.
Drupe. A fleshy or succulent fruit, such as the plum, which has the seed enclosed in a hard and bony putamen or casing; often called a "stone-fruit."

Ebracteate. Having no bracts.
Echinate. Beset with prickles, like the capsule of *Entelea*.
Ecostate. Having no ribs.
Edentate. Having no teeth.
Effuse. Loosely spreading.
Eglandular. Without glands.
Ellipsoidal. A solid with an elliptical outline.
Elliptical. Having the form of an ellipse—oblong with regularly rounded ends.
Elongated. Drawn out in length.
Emarginate. Having a notch at the end, as if a piece had been taken out.
Embryo. The rudimentary plant formed within the seed.
Endemic. Confined to a particular country or region.
Endocarp. The inner layer of the pericarp, lying next the seed.
Endosperm. The albumen or nutritive matter of a seed, usually surrounding the embryo.
Ensiform. Sword-shaped, like the leaf of an Iris.
Entire. Having an even margin, without toothing or division of any kind.
Ephemeral. Lasting for a day, or for a very short time.
Epicarp. The external layer of a pericarp.
Epicorolline. Inserted upon the corolla.
Epidermis. The outer cellular skin or covering of a plant.
Epidermal. On or relating to the outer covering.
Epigynous. At or upon the top of the ovary.
Epipetalous. Inserted upon the petals.
Epiphyte. A plant which grows upon other plants, but not as a parasite.
Equitant. Folded over as if astride, like the basal part of the leaves of *Phormium*.
Erect. Upright; perpendicular to the ground or point of attachment.
Erecto-patent. Intermediate between erect and spreading.
Erose. Toothed in an irregular manner, as if gnawed.
Erostate. Having no beak.
Even. Without inequalities of surface.
Exalbuminous. Having no albumen; applied to those seeds where the embryo occupies the whole space within the testa.
Excurrent. When the vein of a leaf runs through to the apex and protrudes beyond it as a mucro.
Exotic. Foreign; not native.
Expanded. Spread out.
Exserted. Protruding beyond, as stamens beyond the corolla.
Exstipulate. Wanting stipules.
Extrorse. Directed outwards; often applied to the dehiscence of anthers.

Falcate. Sickle-shaped; strongly curved.
Family. A group of plants above the genus in rank, and containing one or several closely allied genera.
Farinaceous. Mealy; containing or having the texture of flour or starch, as the albumen of wheat.
Farinose. Covered with a white mealy substance.
Fascicle. A small bundle or close cluster.
Fascicled. Arranged in a fascicle.
Fastigiate. Applied to a plant when the branches are close together, parallel, and erect, as in the Lombardy Poplar.
Feathery. Plumose; having long hairs which are themselves hairy, as the pappus of *Taraxacum*.
Fenestrate. Pierced with holes, like windows in a wall.
Ferruginous. Rust-coloured.
Fertile. Capable of producing fruit; also applied to stamens which produce pollen capable of fertilizing ovules.
Fibrous. Containing a great proportion of woody fibre.

FILAMENT. (1.) The stalk or support of an anther. (2.) Any thread-like body.
FILAMENTOUS. Composed of threads or filaments.
FILIFORM. Thread-shaped.
FIMBRIATE. Having the margin fringed with narrow processes.
FISTULAR, FISTULOSE. Hollow and cylindrical; reed-like.
FLABELLATE, FLABELLIFORM. Fan-shaped.
FLACCID. Flabby; limp.
FLAGELLIFORM. Long and slender, like a whip-lash.
FLEXUOSE. Bent or curved alternately in opposite directions.
FLOCCOSE. Bearing tufts or locks of woolly hairs.
FLORET. A small flower, one of a cluster or head.
FLORIFEROUS. Flower-bearing.
FOETID. Having a strong and disagreeable smell.
FOLIACEOUS. Having the texture or form of a leaf.
FOLIATE. Leafy; clothed with leaves.
FOLIOLATE. Having leaflets.
FOLLICLE. A fruit consisting of a single carpel, dehiscing by the ventral suture.
FOLLICULAR. Resembling a follicle.
FOOD-STALK. A petiole, pedicel, or other slender support.
FORKED. Branching into two divergent divisions.
FOVEATE. Pitted; marked with depressions.
FROND. The foliage of ferns and other Cryptogams.
FRUCTIFICATION. Fruiting; the organs concerned in the production of fruit.
FRUTICOSE. Shrubby.
FUGACIOUS. Soon falling off or perishing; of short duration.
FULVOUS. Tawny; dull-yellow with a mixture of grey or brown.
FUNICLE. The stalk connecting the ovule or seed with the placenta.
FURCATE. Forked; having divergent branches like the prongs of a fork.
FURFURACEOUS. Scurfy; provided with soft scales.
FUSIFORM. Thick, but tapering towards each end; spindle-shaped.

GALEA. A petal shaped like a helmet.
GAMOPETALOUS. Applied to a corolla in which the petals are more or less united.
GAMOSEPALOUS. Having the sepals more or less united.
GEMINATE. Arranged in pairs; binate.
GENERIC. Relating to the genus.
GENICULATE. Bent like the knee.
GENUS. A clearly defined group of naturally allied species.
GIBBOUS. Protuberant; swelling out into a pouch or sac.
GLABROUS. Having no hairs or pubescence; smooth.
GLABRATE. Becoming glabrous.
GLABRESCENT. Almost glabrous.
GLADIATE. Sword-shaped; ensiform.
GLAND. Any secreting structure, whether depressed or prominent, on any part of a plant.
GLANDULAR. Possessing glands; gland-like.
GLAUCESCENT. Becoming glaucous or sea-green.
GLAUCOUS. Of a sea-green colour.
GLOBOSE, GLOBULAR. Spherical or nearly so.
GLOCHIDIATE. Applied to hairs that are barbed at the end.
GLOMERATE. Arranged in compact clusters.
GLOMERULE. A compact and somewhat capitate cluster of flowers; a small and densely compacted cyme.
GLUMACEOUS. Resembling the glumes of grasses.
GLUME. The term applied to the chaff-like and usually distichous bracts of the inflorescence of grasses and allied plants.
GLUTINOUS. Covered with a sticky secretion.
GRAIN. The fruit of grasses; a caryopsis.
GRANULAR, GRANULOSE. Composed of small grains or rough with small grains.
GYMNOSPERMS. Plants in which the ovule is not enclosed in an ovary, as in the *Coniferae*.
GYNAECEUM. The pistil or pistils of a flower; the female portion of a flower.
GYNANDROUS. Having the stamens adnate to the pistil, as in Orchids.
GYNOPHORE. The stalk or support of the ovary.
GYRATE. Curved into a circle or spiral; circinate.

HABIT. The general appearance of a plant.
HABITAT. (1.) The kind of locality in which a plant grows. (2.) The geographical distribution or range of a plant.
HAIR. A slender outgrowth of the epidermis, either composed of a single elongated cell or of a row of cells.
HAIRY. More or less covered with hairs.
HALOPHYTE. A plant growing within the influence of salt water.
HASTATE. Halbert-shaped; applied to an arrow-shaped leaf with the basal lobes pointing straight outwards.
HELICOID. Coiled into a circle like the whorls of a small shell.
HERB. A plant that has no persistent woody stem.
HERBACEOUS. Having the character of a herb; not woody or shubby.
HERMAPHRODITE. Having stamens and pistils in the same flower.
HETEROGAMOUS. Bearing two kinds of flowers, as in the *Compositae*, where the florets of the disc may be hermaphrodite and those of the ray unisexual or neuter.
HETEROGENEOUS. Dissimilar; not uniform in kind.
HETEROMORPHOUS. Of two or more different forms.
HETEROPHYLLOUS. Having leaves of different forms.
HETEROSPOROUS. Having spores of more than one kind.
HILUM. The scar or place of attachment of the seed.
HIRSUTE. Hairy with long tolerably distinct hairs.
HISPID. Beset with rough hairs or bristles.
HISPIDULOUS. Minutely hispid.
HOARY. Greyish-white with a fine pubescence.
HOMOGAMOUS. Having only one kind of flowers; applied to the flower-heads of *Compositae* when the florets are all alike.
HOMOGENEOUS. Alike, uniform in kind; the opposite of "heterogeneous."
HYALINE. Translucent; colourless.
HYBRID. A cross between two species, obtained when the pollen of one species is placed upon the stigma of the other.
HYPOCRATERIFORM. Applied to a corolla which has a long and slender tube and flat spreading limb, like the Primrose.

IMBRICATE, IMBRICATED. Overlapping, as the tiles on a roof; or, in aestivation, overlapping at the edge only.
IMMARGINATE. Not margined or bordered.
IMPARIPINNATE. Pinnate with an odd terminal leaflet.
INCISED. Having the margin sharply and irregularly cut.
INCLUDED. Not projecting beyond the surrounding organ; the opposite of "exserted."
INCOMPLETE. Not perfect; wanting some of its parts.
INCRASSATE. Thickened.
INCUMBENT. Resting or leaning upon; applied to the embryo when the radicle is folded down upon the back of the cotyledons.
INCURVED. Bent inwards.
INDEFINITE. (1.) Variable in number or very numerous, not easily counted. (2.) An inflorescence not definitely terminated, but continuous with the axis, the lower or marginal flowers being the first to open.
INDEHISCENT. Not opening regularly by valves or otherwise.
INDIGENOUS. Native to the country; not introduced.
INDUMENTUM. Any covering, such as hairiness, &c.
INDUPLICATE. Having the margins folded inwards.
INDURATED. Hardened.
INDUSIUM. (1.) In ferns, an outgrowth of the epidermis covering the sorus. (2.) A cup-shaped membrane or ring of collecting hairs below the stigma, usually well developed in the *Goodeniaceae*.
INDUSIATE. Possessing an indusium.
INFERIOR. Growing below some other organ, as an inferior calyx grows below the ovary, or an inferior ovary appears to grow below the adnate calyx.
INFLATED. Swollen; bladdery.
INFLEXED. Bent abruptly inwards.
INFLORESCENCE. (1.) The flowering portion of a plant. (2.) The manner in which the flowers are arranged on the floral axis.
INFUNDIBULIFORM. Funnel-shaped.
INNATE. Borne on the apex of a support, as an anther fixed on the apex of a filament.
INSERTED. Attached to or growing upon.

INSERTION. The place or mode of attachment of an organ.
INTERNODE. That part of a stem between the nodes.
INTERPETIOLAR. Between the petioles; also applied to the coalesced stipules of two opposite leaves.
INTRORSE. Turned towards the axis; often applied to anthers which open towards the centre of the flower.
INVOLUCEL. An inner or secondary involucre; that which surrounds a secondary or partial umbel.
INVOLUCELLATE. Having a secondary involucre.
INVOLUCRATE. Having an involucre.
INVOLUCRE. A ring of bracts surrounding several flowers, as in the heads of *Compositae* or the umbels of *Umbelliferae;* also sometimes applied to the indusium of ferns.
INVOLUTE. Having the margins rolled inwards.
IRREGULAR. Not regular; unsymmetrical.
ISOMEROUS. Equal in number; applied to flowers having an equal number of parts in the successive whorls, as of sepals, petals, stamens, &c.

KEEL. (1.) A central dorsal ridge resembling the keel of a boat. (2.) The two cohering anterior petals of a papilionaceous flower.

LABELLUM. The third petal of an orchid, by a twist of the ovary placed in front of the flower, and usually very different in form from the remainder.
LABIATE. Lipped; applied to an irregular calyx or corolla which is unequally divided into two parts or lips.
LACERATE. Irregularly torn or cleft.
LACINIATE. Cut into narrow slender teeth or lobes.
LACTESCENT. Yielding milky juice.
LACUNOSE. When the surface is covered with depressions or perforated with holes.
LACUSTRINE. Inhabiting lakes or ponds.
LAMELLA. A thin plate or scale.
LAMELLAR, LAMELLATE. Composed of thin plates, or furnished with them.
LAMINA. The blade or dilated portion of a leaf.
LANATE. Clothed with woolly hairs.
LANCEOLATE. Shaped like a lance-head; tapering upwards from a narrow ovate base.
LANUGINOUS. Clothed with long woolly or cottony hairs.
LATERAL. At the side; fixed on or near the side.
LAX. Loose, distant.
LEGUME. The seed-vessel of *Leguminosae;* a one-celled and two-valved capsule, of very various form.
LEGUMINOUS. Pertaining to or bearing legumes; belonging to the order *Leguminosae.*
LENTICEL. Lenticular corky spots on young bark, corresponding to epidermal stomata.
LENTICULAR. Lens-shaped.
LENTIGINOUS. Covered with minute dots or freckles.
LEPIDOTE. Covered with small scurfy scales.
LIGULE. (1.) A strap-shaped body, as the limb of the corolla in the florets of *Compositae.* (2.) The thin scarious appendage at the junction of the leaf-blade with the sheath in grasses.
LIGULATE. Furnished with a ligule; strap-shaped.
LIMB. (1.) The expanded and usually spreading part of a gamopetalous corolla, as distinct from the tube. (2.) The lamina of a petal or leaf.
LINEAR. Narrow and elongated, with parallel margins.
LINEATE. Marked with lines.
LINEOLATE. Marked with fine lines.
LINGUIFORM, LINGULATE. Tongue-shaped.
LIP. (1.) Either of the two divisions of a bilabiate corolla or calyx. (2.) The labellum of orchids.
LITTORAL. Growing near the seashore.
LOBE. Any division of a leaf, corolla, &c., especially if rounded.
LOBE, LOBATE. Divided into or bearing lobes.
LOBULE. A small lobe.
LOBULATE. Having small lobes.
LOCELLATE. Divided into secondary cells or compartments.
LOCULICIDAL. When the cells of a capsule open along the back between the septa, or by the dorsal suture.

LODICULE. A name applied to the minute hyaline scales just outside the stamens in the flowers of grasses.
LORATE. Strap-shaped; thong-shaped.
LUCID. Having a shining surface.
LUNATE. Half-moon shaped.
LURID. Of a dingy brown or yellow.
LUTESCENT. Yellowish.
LYRATE. Lyre-shaped; pinnatifid with the terminal lobe large and rounded, the lower lobes small.

MACROSPORANGIUM. A sporangium containing macrospores.
MACROSPORE. The larger kind of spore in vascular cryptogams.
MACULATE. Spotted or blotched.
MALE. A plant or flower which possesses stamens.
MAMMILLA. A nipple or teat-shaped projection.
MAMMILLATE. Having nipple-shaped projections.
MARCESCENT. Withering and persistent.
MARGINAL. Placed upon or belonging to the edge or margin.
MARGINATE, MARGINED. Furnished with an edge or border of a different character to the rest of the organ.
MARITIME. Belonging to the sea or the neighbourhood of the sea.
MASSULA. A group of microspores contained in a special envelope, as in *Azolla*.
MEMBRANOUS, MEMBRANACEOUS. Thin, soft, and translucent, like a membrane.
MERICARP. A name applied to one of the two carpels composing the fruit of *Umbelliferae*.
MESOCARP. The middle layer of a fruit or pericarp.
MICROPYLE. The opening or mark in the integument of a seed indicating the position of the foramen of the ovule.
MICROSPORE. The smaller kind of spore in vascular cryptogams.
MIDRIB. The central and principal nerve of a leaf.
MONADELPHOUS. Having the stamens all united by their filaments into a column or tube.
MONANDROUS. Having a single stamen.
MONILIFORM. Resembling a necklace or string of beads; constricted at regular intervals.
MONOCHLAMYDEOUS. Applied to those plants whose flowers have only a single perianth.
MONOCOTYLEDONS. Those plants whose embryo has but one cotyledon or seed-lobe.
MONOECIOUS. Having the stamens and pistils in separate flowers, but borne on the same plant.
MONOPETALOUS. Gamopetalous; having all the petals united by their edges.
MONOPHYLLOUS. (1.) One-leaved, as an involucre composed of a single piece. (2.) Equivalent to "gamosepalous" or "gamopetalous."
MONOTYPIC. Applied to a genus with but one species.
MUCILAGINOUS. Composed of mucilage; slimy.
MUCRO. A sharp terminal point.
MUCRONATE. Possessing a short and sharp terminal point.
MUCRONULATE. Ending in a diminutive mucro.
MULTIFARIOUS. Arranged in many vertical rows or ranks.
MULTIFID. Cleft into many lobes or segments.
MURICATE, MURICATED. Rough with short hard points.
MURICULATE. Diminutive of "muricate"; minutely muricate.
MUTICOUS. Blunt; without a point.

NAKED. Bare; without its usual covering or appendages, as a stem without leaves, a flower without perianth.
NAVICULAR. Boat-shaped.
NECTAR. The sweet secretion within a flower; honey.
NECTARIFEROUS. Honey-bearing.
NERVE. A simple or unbranched vein or slender rib.
NERVED. Having nerves or slender ribs.
NETTED. Reticulated; net veined.
NODE. That part of a stem or branch from which leaves or branches are given off; the knots in the stems of grasses.
NODOSE. Knotty or knobby; usually applied to roots.
NUT. A hard indehiscent one-celled fruit.
NUTLET. A small nut; sometimes applied to the hard seed-like divisions of the fruit of *Labiatae*.

OBCONIC. Shaped like an inverted cone.
OBCORDATE. Inversely heart-shaped, the notch being uppermost.
OBLIQUE. (1.) Unequal-sided. (2.) Slanting; turned to one side.
OBLONG. Considerably longer than broad, with parallel sides and rounded ends.
OBOVATE. Inversely ovate, the broadest part towards the apex.
OBOVOID. A solid with an obovate outline.
OBSOLETE. Wanting or imperfectly developed.
OBTUSE. Blunt or rounded at the end.
OCELLATE, OCULATE. Having circular patches of colour like eyes.
OCHRACEOUS. Ochre-colour; light-yellow with a tinge of red.
OCHREATE, OCREATE. Provided with an ochrea, a tubular stipule sheathing the stem, as in many *Polygonaceae*.
OLIGANDROUS. Having few stamens.
OPPOSITE. Standing against or facing each other, as leaves when two spring from the same node, or when a stamen stands in front of a petal.
ORBICULAR. Applied to a leaf or other body having a circular outline.
ORDER. A group of plants above the family in rank, and containing one or several closely allied families.
ORGAN. Any definite part of a plant, as a cell, a leaf, a flower, &c.
ORTHOTROPOUS, ORTHOTROPAL. Applied to an ovule with a straight axis, the chalaza being at the point of insertion, and the micropyle at the opposite end.
OSSEOUS. Bony.
OVARY. The lower swollen part of the pistil, containing the ovules.
OVATE. Shaped like the longitudinal section of an egg, the broadest part being towards the base.
OVOID. A solid with the shape of an egg.
OVULATE. Possessing ovules.
OVULE. The young seed in the ovary; an organ which after fertilization develops into the seed.
OVULIFEROUS. Bearing ovules.

PALATE. A projection within the throat of an irregular gamopetalous corolla; the prominent lower lip of a bilabiate corolla.
PALEA. (1.) The innermost bract or glume in grasses. (2.) The chaffy scales mixed with the florets on the receptacle of many *Compositae*.
PALEACEOUS. Chaffy or furnished with chaff-like scales.
PALMATE. Lobed or divided so that the divisions radiate from the summit of the petiole.
PALMATIFID. Cut in a palmate manner almost as far as the petiole.
PANDURIFORM. Fiddle-shaped.
PANICLE. A loose irregularly branched inflorescence usually containing many flowers; a branched raceme or corymb.
PANICLED, PANICULATE. After the manner of a panicle; bearing a panicle.
PAPILIONACEOUS. Butterfly-like; applied to the irregular pea-like flowers characteristic of the suborder *Papilionaceae* of the *Leguminosae*.
PAPILLA. A soft superficial gland or protuberance.
PAPILLOSE. Covered with papillae.
PAPPIFORM. Resembling pappus.
PAPPUS. The hairs, bristles, or scales crowning the achene in *Compositae*, representing the calyx-limb.
PAPYRACEOUS. Having the texture of paper.
PARASITE. A plant growing upon another plant and deriving nourishment from it.
PARASITIC. Growing as a parasite.
PARIETAL. Borne on the walls or interior surface of an ovary; attached to the wall of any organ.
PARTITE. Cleft almost to the base.
PARTIAL. A secondary division, as a partial umbel; opposed to "primary" or "general."
PARTITION. An inner wall or dissepiment.
PATENT. Widely spreading.
PATULOUS. Slightly spreading.
PECTINATE. Applied to a pinnatifid leaf with very narrow segments like the teeth of a comb.

PEDATE. Palmately divided with the lateral divisions again two-cleft.
PEDICEL. The stalk supporting a single flower in a compound inflorescence.
PEDICELLATE. Borne on a pedicel.
PEDUNCLE. A general or primary flower-stalk, bearing one or many flowers.
PEDUNCULATE. Furnished with a peduncle.
PELTATE. Shield-shaped; flat and attached to its support by the centre of the lower surface.
PENCILLED. Marked with fine lines.
PENDULOUS. Hanging downwards.
PENICILLATE. Divided into a brush of fine hairs.
PERENNIAL. A plant that lives for several years.
PERFECT. Applied to flowers that have both stamens and pistil.
PERFOLIATE. Applied to leaves the base of which closes round the stem, which thus appears to pass through the leaf.
PERIANTH. The floral envelopes, either the calyx or corolla, or both.
PERICARP. The seed-vessel or ripened ovary.
PERIGYNIUM. The flask-shaped utricle of *Carex* and *Uncinia*, including the true fruit.
PERIGYNOUS. Inserted round the ovary, but more or less adnate to the perianth.
PERSISTENT. Not falling off; remaining attached to its support.
PERSONATE. Applied to a bilabiate corolla having a prominent palate almost or entirely closing the throat.
PETAL. One of the separate parts of a polypetalous corolla.
PETALOID. Having the colour and texture of a petal.
PETIOLATE. Possessing a petiole or foot-stalk.
PETIOLE. The foot-stalk of a leaf.
PETIOLULE. The foot-stalk or petiole of a leaflet, or separate division of a compound leaf.
PHAENOGAM, PHANEROGAM. Applied to plants bearing manifest flowers, containing stamens or pistils, or both.
PHYLLODE. Applied to a petiole when it assumes the shape and functions of a leaf, as in many Australian species of *Acacia*.
PHYLLOTAXIS. The mode in which leaves are arranged on the stems or branches.
PILIFEROUS. Bearing hairs or tipped with hairs.
PILOSE. Furnished with rather long and soft distinct hairs.
PINNA. One of the primary divisions of a pinnate or compound leaf.
PINNATE. Applied to a compound leaf which has its leaflets arranged along both sides of a common rhachis or midrib.
PINNATELY. In a pinnate manner.
PINNATIFID. Pinnately cleft; applied to a leaf which is divided half-way to the midrib or more into lobes or segments placed somewhat similarly to the lateral divisions of a feather.
PINNATISECT. Pinnately divided down to the midrib or rhachis.
PINNULE. A secondary pinna—that is, one of the pinnate or ultimate divisions of a pinna.
PISIFORM. Resembling a pea in size and shape.
PISTIL. The female organ of flowering plants, consisting, when complete, of ovary, style, and stigma.
PISTILLATE. Applied to flowers having a pistil but no stamens; a female flower.
PITTED. Marked with small depressions or pits; punctate.
PLACENTA. That part of the ovary which bears the ovules or young seeds, often consisting of the margins of the carpellary leaves.
PLANE. Having a flat surface.
PLANO-CONVEX. Plane or flat on one side and convex on the other.
PLICATE. Folded lengthwise into plaits like those of a fan.
PLUMOSE. Plume-like; having fine hairs on each side like those of a feather, as in the pappus of some *Compositae*.
POD. A dry many-seeded dehiscent fruit, usually of cruciferous or leguminous plants.
POLLEN. The fine powdery contents of the anther in flowering plants, by whose action when placed on the stigma the fertilization of the ovules is accomplished.
POLLINATION. The placing of the pollen on the stigmatic surface of the pistil.
POLLINIUM. A mass of pollen-grains compacted together, as in *Orchideae*.
POLYADELPHOUS. Having the stamens arranged in several bundles or sets.
POLYANDROUS. Applied to flowers which have many stamens in each flower.
POLYGAMOUS. Having both perfect and unisexual flowers on the same plant.
POLYGONOUS. Having many angles.
POLYMORPHOUS, POLYMORPHIC. Assuming many forms; variable in form or habit.

POLYPETALOUS. Having several distinct petals.
PORE. Any small aperture.
POSTERIOR. Next or towards the main axis; opposed to "anterior."
POSTICOUS. On the posterior side; placed next the axis.
PRAEMORSE. Ending abruptly, as if bitten off.
PRICKLE. A small spine; an outgrowth of the bark.
PROCESS. Any projecting appendage.
PROCUMBENT. Lying along the ground.
PROLIFEROUS. Producing offshoots or buds capable of reproducing the plant.
PROSTRATE. Lying flat on the ground.
PROTANDROUS, PROTERANDROUS. Applied to flowers in which the anthers mature before the pistil of the same flower.
PROTEROGYNOUS. Applied to flowers in which the pistil matures before the stamens of the same flower.
PROTHALLIUM. In the higher cryptogams, a body produced by the germination of the spore, and bearing the sexual organs.
PRUINOSE. Covered with a waxy powdery secretion or bloom.
PUBERULOUS. Minutely downy or pubescent.
PUBESCENT. Covered with short and soft downy hairs.
PULVINATE. Cushion-shaped; growing in thick mats or cushions.
PUNCTATE. Marked with minute dots or depressions, or with internal translucent glands.
PUNCTIFORM. Like a point or dot; reduced to a mere point.
PUNGENT. Terminating in a sharp and rigid point.
PUTAMEN. The hardened endocarp of a drupaceous or stone fruit.
PYRAMIDAL. Shaped like a pyramid.
PYRENE. A small nutlet; a small stone of a drupe or similar fruit.
PYRIFORM. Pear-shaped.

QUADRANGULAR. Having four angles or corners.
QUADRATE. Square in form.
QUADRIFARIOUS. Arranged in four vertical rows or ranks, as the leaves of many species of *Veronica*.

RACEME. An inflorescence having several pedicellate flowers arranged upon a prolonged axis, the lower flowers opening first.
RACEMOSE. Bearing racemes, or like a raceme.
RADIATE. (1.) Diverging from or arranged around a common centre. (2.) Bearing ray-florets, as in many *Compositae*.
RADICAL. Arising from the root or base of the stem.
RAPHE, RHAPHE. The adherent funicle of an ovule, connecting the hilum with the chalaza.
RAY. (1.) One of the branches of an umbel. (2.) A term applied to the outer florets in the flower-heads of *Compositae*, in those cases where they are distinct from those of the disc or centre.
RECEPTACLE. (1.) The more or less expanded or produced apex of the peduncle, upon which the floral envelopes, stamens, and pistil are inserted. (2.) The short conical or convex axis bearing the florets in the flower-heads of *Compositae*.
RECLINATE. With an erect or ascending base, but with the upper portion turned or bent downwards.
RECURVED. Curved backwards or downwards.
REDUPLICATE. Doubled back; in aestivation applied when the margins are valvate and reflexed.
REFLEXED. Bent abruptly down or backwards.
REGULAR. Symmetrical or uniform in shape or structure.
RENIFORM. Kidney-shaped.
REPAND. With the margin slightly sinuate or wavy.
REPLUM. A frame-like placenta left by the falling of the valves in the dehiscence of the pods of some *Cruciferae* and *Leguminosae*, &c.; particularly obvious in *Carmichaelia*.
RETICULATE. Provided with markings or venation resembling network.

RETRORSE. Directed backwards or downwards.
RETUSE. Having a rounded apex with a shallow notch at the centre.
REVOLUTE. Having the margins or apex rolled backwards.
RHACHILLA. The axis of the spikelet in grasses.
RHACHIS. The axis of an inflorescence, or of a compound leaf or frond.
RHIZOME. A prostrate or underground rootstock or stem, giving out roots below, the apex progressively sending up leaves or stems, sometimes short and tuberous.
RHOMBIC. Obliquely four-sided.
RHOMBOID, RHOMBOIDAL. Approaching a rhombic outline; quadrangular with the sides oblique.
RIB. A primary or prominent nerve or vein.
RIBBED. Furnished with prominent ribs.
RIGID. Stiff and inflexible.
RINGENT. Gaping; as a labiate corolla with an open throat.
ROSTELLATE. Having a small beak; the diminutive of "rostrate."
ROSTELLUM. A viscid portion of the column in *Orchideae*, answering to the abortive anterior lobe of the stigma.
ROSTRATE. Beaked; gradually narrowed into a rather long slender point.
ROSULATE. Collected into a rosette.
ROTATE. Wheel-shaped; applied to a gamopetalous corolla with a short tube and flat spreading limb.
RUDIMENT. Any imperfectly developed and functionally useless organ.
RUFOUS. Reddish; pale-red mixed with brown.
RUGOSE. Wrinkled; covered with wrinkled lines or ridges.
RUGULOSE. Somewhat wrinkled.
RUMINATED. Having the appearance of being chewed, as the albumen of the nutmeg.
RUNCINATE. Applied to a pinnatifid leaf in which the lobes or segments point towards the base of the leaf.

SACCATE. Pouch-shaped; furnished with a sac or pouch-like cavity.
SAGITTATE. Shaped like the head of an arrow; triangular, with two basal lobes prolonged downwards.
SARCOCARP. The fleshy or succulent part of a drupe or stone-fruit.
SARMENTOSE. Producing long and flexible twigs or runners.
SCABERULOUS. Somewhat rough or scabrous.
SCABRID. Slightly rough.
SCABROUS. Rough to the touch; furnished with minute points or asperities.
SCALE. A name usually applied to variously modified bracts or depauperated leaves, thin and scarious or coriaceous or fleshy, often imbricated.
SCANDENT. Climbing.
SCAPE. A naked peduncle arising from the crown of the root, or from among the radical leaves.
SCAPIGEROUS. Bearing scapes.
SCARIOSE, SCARIOUS. Thin, dry, and membranous, not green.
SCORPIOID. Applied to a unilateral circinately coiled inflorescence, unrolling as the flowers expand.
SCROBICULATE. Marked by minute depressions.
SCUTELLATE. Shaped like a small platter.
SECUND. Turned or pointing to one side only.
SEED. The ripened ovule, consisting of the embryo and its proper envelopes.
SEGMENT. One of the divisions into which a leaf or other organ may be cleft or divided.
SEPAL. A name applied to each of the separate parts or divisions of a calyx.
SEPALOID. Resembling a sepal.
SEPTATE. Divided by partitions or septa.
SEPTICIDAL. When the cells of a capsule open through the dissepiments or lines of junction of the carpels.
SEPTIFRAGAL. When the valves of a capsule in dehiscence break away from the dissepiments.
SEPTUM. A partition dividing a cavity.
SERICEOUS. Silky; clothed with soft straight appressed hairs.
SERRATE. Applied to a leaf having its margin furnished with teeth like those of a saw.
SERRATURES. Teeth like those of a saw.
SERRULATE. Minutely serrate.

SESSILE. Sitting directly on the point of support without any intervening foot-stalk or petiole.
SETA. A bristle of any kind; a stiff hair.
SETACEOUS. Bristle-like.
SETIFORM. Having the shape of a bristle.
SETIGEROUS. Bearing bristles or furnished with bristles.
SETOSE. Beset with bristles.
SETULOSE. Provided with minute slender bristles.
SHEATH. A tubular envelope investing the stem, as the lower part of the leaf in grasses.
SILICULE. A short pod or siliqua, not much longer than broad.
SILIQUA. The pod-like fruit of the *Cruciferae*, having two valves falling away from a frame (replum) on which the seeds are placed.
SIMPLE. Of one piece; not compound.
SINUATE. Having a deep waved margin.
SINUS. An angular or rounded recess or depression separating lobes or segments.
SMOOTH. (1.) Having an even surface; not rough; opposed to "scabrous." (2.) Glabrous or free from hairs; opposed to "pubescent."
SORUS. A cluster of sporangia in ferns.
SPADIX. A spike with a thickened fleshy rhachis and usually enclosed or subtended by a large bract or spathe, as in many Aroids.
SPARSE. Thinly scattered.
SPATHE. A large often coloured bract enclosing an inflorescence, usually a spadix.
SPATHULATE. Oblong, with the lower end much drawn out, so as to resemble a druggist's spatula.
SPECIES. A group of all those individuals possessing the same constant and distinctive characters.
SPICATE. Like a spike, or arranged in a spike.
SPIKE. An inflorescence having several or many sessile flowers arranged on a lengthened axis, the lower flowers opening first.
SPIKELET. In grasses and sedges, applied to a cluster or small spike of one or more flowers, usually subtended by a pair of glumes.
SPINE. A sharp woody or rigid outgrowth from the stem; a modified branch, leaf, or stipule.
SPINESCENT. Ending in a spine or sharp point.
SPINOSE. Furnished with or resembling spines.
SPINULOSE. Having small spines; the diminutive of "spinose."
SPORANGIUM. In the higher Cryptogams, the case or sac which contains the spores.
SPORE. In Cryptogams, a minute body or cell capable of germination, but not possessing an embryo as in a true seed.
SPUR. A slender tubular process from some part of a flower, often containing nectar.
SQUAMATE, SQUAMOSE. Furnished with scales; scaly or scale-like.
SQUARROSE. Rough with spreading projections or processes, as the tips of bracts.
STAMEN. The pollen-bearing organ of the flower, consisting of an anther usually borne on a filament or stalk.
STAMINIFEROUS. Stamen-bearing.
STAMINODIUM. A sterile or abortive stamen.
STANDARD. The broad upper petal of a papilionaceous flower.
STELLATE. Star-shaped; radiating from a centre like the points of a star.
STEM. The main ascending axis of a plant.
STERILE. Barren; applied to flowers wanting a pistil, or to stamens destitute of anthers or pollen.
STIGMA. That portion of the pistil which receives the pollen, usually situated at the tip of the style.
STIGMATIC. Relating to or belonging to the stigma.
STIGMATOSE. Provided with stigmas.
STIPES. (1.) The petiole or foot-stalk of the frond of a fern. (2.) The stalk or support of the gynaeceum or carpel, or other organ.
STIPELLA. A secondary stipule, sometimes found at the base of the leaflets of compound leaves.
STIPITATE. Borne on a stalk or stipes.
STIPULATE. Provided with stipules.
STIPULE. Appendages of various kinds arising from the base of the petiole of a leaf.
STOLON. A horizontal sucker or runner from the base of a plant, usually rooting at the tip.
STOLONIFEROUS. Sending out stolons.
STRIATE. Marked with fine longitudinal lines.

STRICT. Upright and very straight.
STRIGILLOSE. Minutely strigose.
STRIGOSE. Covered with short, straight, stiff, and appressed sharp-pointed hairs.
STROPHIOLATE. Possessing strophioles.
STROPHIOLE. An appendage situated near the hilum of some seeds.
STYLE. The upper attenuated part of a pistil or carpel, bearing the stigma at its top. It is often very short or wanting.
STYLIFORM. Style-shaped; resembling a narrow cylinder.
STYLOPODIUM. A swollen expansion at the base of the style in the *Umbelliferae*.
SUBULATE. Awl-shaped.
SUCCULENT. Juicy and fleshy.
SUFFRUTESCENT, SUFFRUTICOSE. Slightly or somewhat shrubby; woody at the base.
SULCATE. Grooved or furrowed.
SUPERIOR. Growing or placed above. The calyx is said to be superior when it appears to spring from the top of the ovary; on the other hand, the ovary is superior when it is free from the calyx and is consequently placed above it.
SUSPENDED. Hanging directly downwards; hanging from the apex of a cell.
SUTURE. A junction or line of union or dehiscence.
SYMMETRICAL. Regular in its shape or in the number of its parts.
SYNCARPOUS. Composed of two or more united carpels.
SYNONYM. A superseded or disused name.

TAIL. A long and slender terminal prolongation.
TEETH. Any small marginal or terminal lobes.
TENDRIL. A filiform coiled or twining process by which one plant clings to another.
TERETE. Cylindrical or nearly so, not angled or grooved.
TERNATE. Arranged in threes, as three in a whorl or cluster, or when three leaflets or segments start from the same point.
TESTA. The outer coat of the seed.
TETRADYNAMOUS. Having four long and two shorter stamens, as in the flowers of *Cruciferae*.
TETRAGONAL, TETRAGONOUS. Having four angles.
TETRAMEROUS. Composed of four parts or members.
TETRANDROUS. Having four stamens.
TETRAPTEROUS. Four-winged.
THALLOID. Resembling a thallus.
THALLUS. A vegetative body without distinction of stem or leaf.
THROAT. The orifice of a gamopetalous corolla or calyx; that portion of the corolla or calyx between the limb and the tube.
THRYSUS. A contracted or ovate panicle, broadest about the middle.
TOMENTOSE. Densely covered with matted wool or short hairs.
TOMENTUM. Densely matted woolly pubescence.
TOROSE. Cylindrical or nearly so, with constrictions at regular intervals.
TORTUOUS. Twisted or bent in different directions.
TORULOSE. The diminutive of "torose."
TORUS. The receptacle of a flower; the more or less modified apex of the peduncle, upon which the parts of the flower are inserted.
TRABECULATE. Furnished with markings like cross-bars.
TRANSVERSE. Lying or placed across.
TRIANDROUS. Having three stamens.
TRIANGULAR. Three-angled; having the shape of a triangle.
TRICHOTOMOUS. Three-forked; branching into three divisions springing from one point.
TRIFID. Three-cleft.
TRIFOLIOLATE. Having three leaflets.
TRIFURCATE. Having three forks or branches.
TRIGONAL, TRIGONOUS. Three-angled, with flat faces.
TRIMORPHIC. Occurring in three forms.
TRIPARTITE. Divided to the base into three parts.
TRIPINNATE. Thrice pinnate; when the leaflets of a bipinnate leaf are again pinnate.
TRIPINNATIFID. Thrice pinnatifid.
TRIQUETROUS. Acutely three-angled with the faces concave.
TRUNCATE. Ending abruptly, as if cut off transversely.

TUBE. (1.) Any hollow elongated body or part of an organ. (2.) The lower united portion of a gamopetalous corolla or calyx.
TUBER. A short and thick subterranean branch or rhizome, furnished with scattered buds or "eyes," from which new shoots can arise.
TUBERCLE. A small projection or wart-like excrescence.
TUBERCULATE. Covered with small warts or excrescences.
TUBEROUS. Resembling a tuber.
TUBULAR. Tube-shaped; cylindrical and hollow.
TUMID. Swollen or inflated.
TUNICATE. Having several concentric coats or tunics, like an onion.
TURBINATE. Top-shaped.
TURGID. Swollen or distended.
TWINING. Climbing by twining or winding round a support.
TYPE. The ideal representative of a species or other division.
TYPE-SPECIMEN. The original specimen from which a description of a particular species was drawn up.
TYPICAL. That which corresponds with or represents the type.

UMBEL. An inflorescence in which several pedicels of about the same length radiate from the top of a common peduncle. An umbel is said to be simple when each of its pedicels or rays ends in a single flower; compound when each ray bears a secondary umbel.
UMBELLATE. Having the inflorescence arranged in umbels.
UMBELLULE. A secondary umbel.
UMBILICATE. Having a depression in the centre; navel-like.
UMBONATE. Bearing a convex projection or boss.
UNCINATE. Hooked at the extremity.
UNDULATE. Wavy; having a waved or sinuous margin.
UNGUICULATE. Applied to a petal which is narrowed at the base into a claw.
UNILATERAL. One-sided.
UNILOCULAR. One-celled.
UNISERIATE. Arranged in a single horizontal row or series.
UNISEXUAL. Of one sex; applied to flowers having stamens only or pistils only.
URCEOLATE. Urn-shaped; contracted at the mouth like an urn or pitcher.
UTRICLE. (1.) A seed-vessel consisting of a thin loose pericarp enclosing a single seed, as in *Chenopodium*. (2.) A membranous sac enclosing the fruit proper in *Carex* and *Uncinia*. (3.) Any bladder-shaped appendage.

VAGINA. A sheath, as of a leaf.
VAGINATE. Sheathed.
VALLECULE. A term applied to the grooves between the ribs of the fruit in *Umbelliferae*.
VALVATE. (1.) Opening by valves, as in the majority of dehiscent fruits and many anthers. (2.) In aestivation, applied when the parts of a flower-bud meet exactly at their edges without overlapping.
VALVE. One of the divisions into which a capsule or other dehiscent fruit separates at maturity; the door-like lid by which many anthers open.
VARIEGATED. Irregularly coloured in patches or blotches.
VARIETY. A subdivision of a species, differing from the type in certain constant characters of subordinate value.
VEIN. A strand of vascular tissue traversing a leaf or any other flat organ.
VEINED. Furnished with veins.
VEINLESS. Destitute of evident veins.
VEINLET. A small vein, or the ultimate branch of a vein.
VENATION. The manner in which the veins of leaves are arranged.
VENTRAL. The anterior or inner face of a carpel, &c.; the opposite of "dorsal."
VENTRICOSE. Swelling or inflated on one side.
VERNICOSE. Shiny, as if varnished.
VERRUCOSE. Covered with wart-like projections.
VERSATILE. Swinging freely on its support, as many anthers on their filaments.
VERTICAL. Upright; perpendicular to the plane of the horizon.

VERTICIL. A whorl, or an arrangement of similar bodies, as leaves in a circle about the axis.
VERTICILLATE. Arranged in whorls or verticils.
VESICLE. A small bladder or cavity.
VEXILLUM. The standard, or large upper petal of a papilionaceous corolla.
VILLOSE, VILLOUS. Bearing long and soft straightish hairs.
VIRGATE. Like a wand or rod; slender, straight, and erect.
VISCID. Glutinous or sticky.
VITTAE. The longitudinal oil-tubes in the pericarp of most *Umbelliferae*, easily seen when the fruit is cut across.
VITTATE. Furnished with vittae.
VIVIPAROUS. Propagating by buds or bulblets instead of seeds, or with the seeds germinating while still attached to the plant.

WHORL. Any arrangement of organs in a circle round an axis; a verticil.
WING. (1.) Any membranous or thin expansion or appendage attached to an organ. (2.) A lateral petal of a papilionaceous flower.

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Gaimardia minima =
alopyrum Hieronymus
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